THE PROFITS AND GROWTH OF U.K. COMPANIES

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CONTENTS

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Abstract of Thesis

The thesis concentrates on two aspects of the relationship between growth and profitability. Firstly it asks whether the supply of internal finance acts as a constraint upon growth by new investment on the one hand and growth by takeover on the other. Secondly it traces the consequences for the amalgamation's profitability of growth by takeover. It can, then, be seen as tracing some effects of two of the major recent developments in the U.K. company sector: the savings squeeze and the merger boom, both of which are documented in the thesis. The analysis draws on the accounts of all but the smallest U.K. quoted companies for the period 1948-1972. Its chief conclusions are that new investment in fixed assets is likely to have been restrained by the savings squeeze; that expansion by takeover appeared to be less sensitive than new investment to the availability of internal finance; and that the rate of return on the amalgamation's capital typically showed a decline after merger. On the policy side it calls for a change in the basis of profit measurement; traces relations between the rate of inflation, the distribution of income and the level of investment - which bear on fiscal and incomes policies; and supports the demands of some economists for a less permissive state policy towards merger.

CHAPTER 1.

Introduction

Cross-section analysis of company accounting data has suggested a fairly strong positive association between the rate of growth of companies' capital and the rate of profit on capital.(1) The thesis takes up this relationship, asking whether it could mean firstly that a reduction in the rate of profit achieved by a firm would cause its growth rate to be reduced; and secondly, that a more rapid rate of growth by the firm would yield a higher rate of profit when that higher growth was achieved by takeover.(2)

These questions are prompted by two striking features of the U.K. company sector in the late sixties: a profit squeeze and a takeover boom. According to some observers at least, company profits were in steep decline in these years(3); while on the growth side investment has been sluggish in most years since the late sixties.(4) Although their rate

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(1) See Singh and Whittington (1968); Whittington (1971) and chapter 9 below.

(2) The earlier work (Footnote 1) has argued that the direction of causation runs from profit to growth; and this argument is developed below (chapters 3 and 9). Chapters 7 and 8 observe the effect of growth on subsequent profitability.

(3) See chapter 2 and Appendix A on the debates which have raged over this issue.

(4) See chapter 3 and National Institute Economic Review (1974) (Summary Tables).

of growth by new investment in fixed assets was unremarkable, however, British companies were at this time indulging in an unprecedentedly frenetic rate of takeover activity,[5] sanctioned if not positively encouraged by the government of the day on the grounds that efficiency (and presumably profitability) would thereby be enhanced.

Part 1 of the thesis concentrates on the one component of growth, new investment in fixed assets, and is concerned primarily with its dependence on profitability. It documents the path of profit since the early sixties, discussing which components of profit are available for investment under an inflationary regime, and estimates a model of investment incorporating measures of internal finance as explanatory variables. Throughout this part of the thesis, it is assumed that new investment in fixed assets is a Good Thing, enhancing the economy's productive capacity: the matter at issue is why the U.K. has not achieved more. Some government spokesmen in this period[6] would also have conferred this title on the

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(5) See chapter 6 and Appendix C.

(6) See the quotation from Mr. Anthony Crosland in Chapter 7.

other major means(7) of expanding the company's capital, takeover. Having described the scale of takeover activity in chapter 6, Part 2 of the thesis puts to the test this presumption that takeover typically results in enhanced productive efficiency for the combine; it returns in the final chapters to issues in the finance of growth - and in particular to whether any finance control operates differently for the two means of expansion, takeover and new investment.

The theoretical framework of the thesis is close to that of the managerial or growth theorists of the firm - especially Penrose (1959) and Marris (1964). It takes as a starting point the divorce of ownership from control for many of the larger U.K. companies and the enjoyment of some discretion by managers in a world of imperfect product and factor markets.

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(7) The residual of net asset growth after deducting growth by takeover and net investment in new fixed assets, is the accumulation of net current assets. This component of growth is only dealt with incidentally in the thesis. It may often represent illusory growth (e.g. stock appreciation: see chapter 2) or be the result of passive accumulation of undistributed profits (see chapter 4 on the negative relationship between investment and liquidity balances). Attention is concentrated on the two components of growth which always involve managerial initiative.

In fact many of the issues considered in the thesis can be summarised using the diagram of growth-profitability relationships devised by Marris and reproduced in figure 1.A. A finance constraint representing the maximum rate of growth which can be financed at a given rate of profit is central to Part 1's pre-occupation with the availability of internal finance for investment; and to Part 2's attempt to distinguish the constraint which operates if growth is achieved by new investment from that when growth is attained by takeover. The curve with the inverted U-shape represents the dependence of profitability on the rate of growth. Whether the relationship may be inverse in the upper range of the growth rate(8) is the subject of some work in chapters 8 and 9. Why managers might choose a strategy which yielded a higher growth rate but a lower profit rate than available alternatives is taken up in chapter 10 and Appendix E; and whether the attainment of a higher growth rate via takeover might result in lower profitability on the amalgamation's assets is the principal subject of Part 2.

The approach to this area of work could take one of several forms. One might concentrate on relating conclusions for company behaviour to broader existing theories - for instance examining their implications for a neo-classical or Keynesian macro theory of the whole economy. Alternatively, given its

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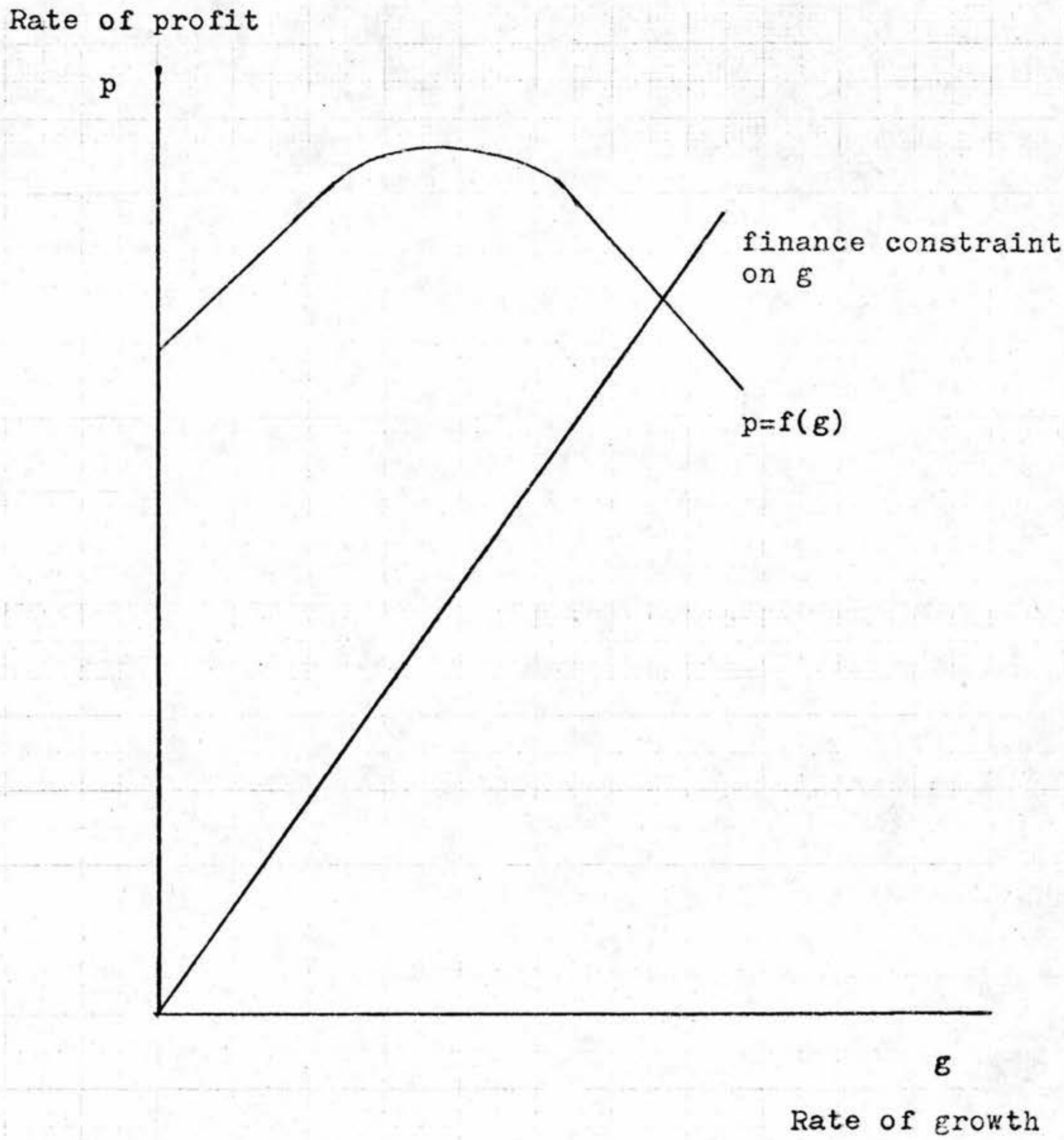
(8) On account of 'Penrose Effects'.

FIGURE 1.A. Profitability and Growth



well-known but unresolved identification problems[9] and ample scope for multi-equation models, it might be seen as a potentially fruitful area for sophisticated econometric analysis. In fact, neither of these tacks has been chosen; while theoretical and econometric issues have not been ignored, the principal aim has been to resolve issues for public policy as directly as possible. The first part focusses on the desire of successive post-war governments to secure a higher rate of investment, or to prevent by fiscal, monetary and incomes policies the demand for higher immediate consumption from pre-empting the resources available for investment. It examines the role of internal finance as a device for rationing investment. Apart from considering the effectiveness of this rationing mechanism, it traces some of the consequences of inflation and of the company tax system for the flow of internal finance; and is concerned, wherever possible, to find implications for fiscal and incomes policies. The second part contributes some answers to the question whether government policy towards takeover should be less permissive.

The treatment of thesetopics is empirical; and the strength of the conclusions which do emerge derives to a large extent from the mass of observations on which they are based. For the data bank used in the analysis contains the published accounts together with other financial information for all

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(9) See Section 3.C and chapter 9, footnote 4.

but the smallest U.K. quoted companies for the whole period 1948-1971. Its contents total five or six million observations; a single chapter (for instance chapter 9) may use some 2 million of them; and whereas earlier British studies on the topics adopted in the thesis have typically reported the experience of no more than 50 companies,(10) a thousand or more contribute to the analysis here.

Of course the preparation of this data bank has absorbed a good deal of research effort - perhaps 18 months of the time devoted to the thesis - apart from that of earlier research workers at the National Institute of Economic and Social Research and the Department of Applied Economics at Cambridge. Some of the stages of the work are detailed in Appendix F. It is, however, already bearing fruit apart from the research results of the project at Edinburgh. Parts of the data bank together with the documentation developed at earlier stages of the doctoral work(11) have been supplied to Queens' College, Cambridge and Nuffield College Oxford; and a complete copy has been handed over to the London Business School who are amalgamating it with their data bank on share prices as well as providing further copies of the data to other academic uses.(12)

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(10) See Section 4.C and Appendix H for a discussion of earlier work. The joint and individual work of Singh and Whittington is a notable exception to this generalisation; but they were only incidentally concerned with the special issues selected here.

(11) See Department of Accounting and Business Method (1974).

(12) Members of the Universities of Exeter and of Ulster have already taken advantage of this facility.

Some might admit that the quantity of accounting data used was adequate, but question whether its quality passed muster. At the very least one might retort that this data is very carefully prepared. A vast army of clerical workers is employed within companies to build up these accounts from detailed and documented transactions; and a smaller army of trained independent auditors is devoted to verifying the accounts and ensuring their conformity with standard practice. The accounting institutes aim to secure consistency of treatment between companies by reviewing a large sample of published company accounts every year,[(13)] and by issuing statements of standard accounting practice. The type of information provided, on the difference between revenue and expenses, is central to the issues raised in the thesis, of the internal finance available for investment, and of firms' productive efficiency. Moreover, this information is the ultimate source of data on which company tax assessments and much national income accounting are based, as well as often being the best information on the firms' activities available to shareholders, creditors and sometimes to managers too. In addition, the data used here are in one respect superior to those available in published accounts since they have passed through a further stage of standardisation by the Department of Industry (see Appendix F).

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(13) See Chartered Accountants' Trust for Education and Research (1972).

Nevertheless, it must be admitted that the information is imperfect. Inconsistencies of treatment do survive the controls just detailed to produce data for particular variables which are not strictly comparable between companies (see Appendix F). However, unless an inconsistency is known to systematically distort a particular variable which is central to the analysis, it is assumed that it affects the companies in the population randomly, and that while it may affect the interval estimate of a mean or relationship (producing dispersion about the average), it will not affect the point estimate (i.e. produce a bias). Still there remain clear cases of bias in the picture given by historic cost accounting information of certain economic trends or relationships. Indeed, much of the work in Part 1 of the thesis was prompted by a recognition that conventional accounting profit was not an adequate measure of the funds at the disposal of managements for taxation, distribution and new investment; and chapter 2 together with Appendices A and B pursues this theme, arguing against proponents of the conventional measures and for changes in the definition of profit for analysis and for tax purposes. Again, parts of the study in Part 2 were stimulated by the fact that the literature on takeover's effect on profitability had generally used a measure of profitability that was known to give biased results because of accounting conventions, and that the direction of the bias means that its removal would moderate or reverse the conclusions reached in earlier works.

Accordingly, Appendix D is devoted to a discussion of takeover accounting and to developing a method of removing the bias which is then applied in chapters 7 and 8.(14)

In general, then, the thesis shows a polite scepticism towards the data; and the criticism has been repeatedly sought of accountants hostile to present conventions and practice.

Some explanation is perhaps required of the fact that around a half of the volume of the thesis appears in Appendices. The Appendices have two functions. From Appendix F onwards, they incorporate tedious detailed material on which the analysis is based: wherever possible, supplementary results, detailed definitions and lengthy surveys of earlier work were relegated from the main body of the thesis to leave the

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(14) Sometimes biases are known to exist but cannot be readily quantified and taken into account directly; so the bias is noted and the conclusion qualified. This happens especially in chapter 9 and Appendix C.

It may seem odd that chapter 2 is so sceptical of conventional measures of profit and yet that Part 2 uses these measures as an index of efficiency. But in the first place there is no reason to believe that any of the alternative profit measures proposed would yield a different picture in Part 2: the chief causes of divergence between conventional and some measure of 'real' profit (e.g. stock-profit ratios, capital intensity), are not likely to be related to takeover activity. In the second place, chapters 7 and 8 compare the profitability of an acquirer after merger with its own level prior to merger: and since the same distortions are likely to affect the measure throughout, the change in this measure may yet approximate that of a preferable measure. Of course, as Appendix B in particular suggests, agreement is lacking on what would constitute a preferable measure.

principal arguments as little cluttered as possible. Thus these six Appendices are included more for reference than for sustained reading. The first five Appendices on the other hand have a quite different role. These might all have been included as chapters of the thesis: they each pursue issues which have a part in the main argument. They do, however, generally go into rather more detail on these issues than is necessary to sustain the arguments of the thesis, and their inclusion as chapters might sometimes have produced divergences from the main themes.

Several of the Appendices have been, or will soon be, published separately (sometimes in an earlier version): Appendix A in the A.U.T.A. News Review (Spring 1975); C in The Economic Journal (December 1975); E in the Journal of Industrial Economics (August 1975)(15); while part of B was submitted as evidence to the Sandilands Committee on Inflation Accounting in April 1974. Of the main body, only a version of chapter 2 has been published (Bulletin of the Oxford University Institute of Economics and Statistics, November 1974).

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(15) Appendices C and E were written jointly with G. Whittington.

PART 1

PROFITS, SAVINGS AND INVESTMENT

Chapter 2. Profit Illusion: the relationship between profit and the internal finance available for investment[1]

Are profits being squeezed? Drawing data from the same basic source, two sets of observers reach quite opposite conclusions. On the one hand, Glyn and Sutcliffe (1971) and (1972) maintain that the sixties witnessed a severe decline in profitability; whilst, on the other, Panic and Close (1973) object that "after 1960 there is simply no evidence of a significant decline in the pre-tax profitability of U.K. industry", and that "the inclusion of investment grants would probably eliminate completely the downward trend in post-tax profitability between 1961 and 1969." More recent work shows that such contradictory opinions result from different profit measures. It is the aim of this chapter to pursue this theme, suggesting that different measures of profit may be appropriate for different issues. It is argued that a single measure, giving a clear answer, is appropriate for one of the issues with which both sides were much concerned: whether companies' ability to finance investment from internal sources has been curtailed.

a. The framework

To demonstrate the way in which the choice of measure can so drastically affect the apparent record, and to argue for a measure appropriate to questions of internal finance, requires some discussion of accounting conventions. As a framework for this discussion, companies' gross income, the difference between their sales and all

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1. An earlier version of this chapter was submitted to the Sandilands Committee on Inflation Accounting in April 1974; and a subsequent version was published in the Bulletin of the Oxford University Institute of Economics and Statistics, November 1974.

their purchases except fixed assets, may be analysed in terms of the following components, each of which will subsequently be more closely defined and evaluated:

D: companies' historic cost depreciation provisions

T: taxation payable on the year's profits

C: dividends and interest

A: stock appreciation

Z: (K-D) where K is capital consumption, at current prices

R: net retentions, after deducting stock appreciation and capital consumption

A+Z+R: conventional retentions as recorded by companies

P = T+C+A+Z+R: pre-tax profits, after deducting depreciation, as conventionally recorded by companies

It is on the basis of movements in a net profit measure (R) that Glyn and Sutcliffe argue the existence of a severe profits squeeze in the sixties.[2] By contrast, Panic and Close's contention that profits have more or less been maintained rests on the path of the conventional measure (P). Two subsequent analyses (National Institute Economic Review, 1973, p.20; Burgess and Webb, 1974) have confirmed these relative movements in R and P. Clearly, the divergence between them must be accounted for by an increase in one or more of the other components of P. In order to identify the main contributors to this divergence, the role of each component is examined in turn (sections b. to d.) before their joint

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2. In these conclusions profits appear variously as a proportion of companies' capital, or as a share in national income.

TABLE 2.A.

THE SHARE OF CONVENTIONAL PROFIT TRANSFERRED TO THE GOVERNMENT AND TO SHARE- AND DEBENTURE-HOLDERS, ETC.

Year	T/P %	C/P %	(T+C)/P %
1961	43.7	28.2	71.9
1962	43.5	30.6	74.1
1963	42.9	30.0	72.9
1964	42.8	29.5	72.3
1965	33.2*	30.0	63.2
1966	48.4	31.9	80.3
1967	40.5	31.7	72.2
1968	43.3	29.1	72.4
1969	44.6	29.8	74.4
1970	39.6	31.4	71.0
1971	40.8	30.8	71.6
1972	37.6	26.2	63.8
Averages:			
1961-66	42.4	30.0	72.4
1967-72	41.1	29.8	70.9

T = taxes on profits + Schedule F income tax on dividends - investment grants

C = dividends (net of income tax) + loan interest

*the unusually low figure for 1965 and the high figure for 1966 are caused by the transition between tax systems, and tend to offset one another.

Source: derived from aggregates for U.K. quoted companies (see Department of Trade and Industry).

effect on the company sector's internal finance is assessed (section e.).

b. Transfers to the government and to shareholders

The shares of conventional profit (P) set aside for dividends plus interest and for taxation are considered first, and it emerges that neither rose over the period.[3] Table 2.A. shows C and T as percentages of P. The "dividend" figure represents loan interest plus the net dividend receivable by the shareholder for the year: under the corporation tax system, Schedule F income tax on dividends has been included in taxation.[4] Taxation then includes all the

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3. The basic data used throughout this chapter are the aggregate accounts of U.K. quoted companies engaged in manufacturing, distribution, etc., compiled by the Department of Trade and Industry. These figures suffer from two weaknesses. Firstly, they exclude certain small quoted companies as well as all non-quoted companies - and so account for only about three-quarters of total company profits as recorded in the Blue Book. Secondly, the population of companies changes in three years of the period (1964, 1969, 1971) so, for these years, two values are reported in the diagrams, one comparable with the previous year, one with the subsequent year. These figures are preferred to others available, for instance those in Financial Statistics, since they include extra information which is necessary at several stages in the argument below (such as companies' own depreciation provisions, and analysis of the figures by industry). As both Panic and Close and Glyn and Sutcliffe use the same data, the results in this chapter may be directly compared with those of the main protagonists in the debate.

4. This treatment of income tax on dividends is not crucial, since an alternative treatment would leave unchanged the joint proportion of P accounted for by C and T: the main argument would be unaffected. King (1973) includes this income tax on dividends in his post-tax measure of profit to which he appeals in support of his contention that the effective tax rate has fallen and companies' liquidity has not been squeezed. This chapter disputes not King's figures as such but his argument that such a measure properly reflects companies' flow of internal finance. A subsequent paper by King (1975) is more circumspect in discussing whether there has been a profits squeeze. Its chief conclusion is that taxation has been declining as a share of company income. Again/

tax payable by the company on behalf of its shareholders (that is income tax plus profits tax in the early sixties, and corporation tax plus income tax under the later system); and it also takes account of the variety of investment incentives offered by the government during the period. In the earlier years, investment allowances and accelerated depreciation for tax purposes made the effective average tax rate (shown here) lower than the nominal rate; whilst from 1967 investment grants have (in my figures) been offset against the companies' tax liability to leave the net figure payable to the government. Comparing averages for the second half of the period with those for the first half shows that, with these definitions, the share of dividends and interest and that of net taxation are both slightly lower in the later period. Transfers to government and shareholders do not, then, appear to contribute to the decline in net retentions (R) in relation to conventional profit (P).

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4. Contd.

Again, however, this conclusion relies on his exclusion of the tax levied on dividends from his definition of companies' tax liability. The amount of this tax on dividends has risen in relation to other company taxation in the period King studied: it represents less than 20% of the tax liability à King in the early fifties, whereas, under the Corporation Tax System of the late sixties, with its penal rate of tax on dividends, the percentage exceeded 50%. It is hard to reconcile King's argument, that the inclusion or exclusion of tax on dividends does not affect the trends he reports, with the increasing importance of taxation on dividends. (He contends (1975, p.37): "If the tax liability is defined to include the income tax on dividends the level of the share of [post-tax] profits would be lower than the estimates given below, but the trend in the share would be unaffected.") Adoption of the alternative tax definition (including tax on dividends) would surely vitiate his argument that the share of tax in profit has declined steeply.

c. The impact of stock appreciation

By contrast with taxation and dividends, stock appreciation is not a simple transfer of income, and is not recorded in companies' conventional accounts. Accordingly, a more detailed treatment is required of the way it impinges on companies' ability to finance investment.

The conventional accounting profit on a unit of output consists of its sale price less the recorded costs of the actual inputs required to produce that output. In the context of rising input prices, it is convenient to separate out one component of profit from the rest in the following way:

(a) the difference between the sale price of the output and the then current price of the inputs necessary to produce the good (T+C+Z+R per unit);

(b) the difference between the current price of these inputs and the actual price paid for them earlier (A, stock appreciation, per unit).[5]

If the physical volume of stocks is to be maintained, part (b) of profit will be absorbed immediately in the purchase of new inputs (replacement stocks) at the new higher prices.[6] A monetary gain is realised, and recorded in conventional profit, but then pre-empted to maintain stocks: part (b), stock appreciation, does not

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5. This is just a heuristic simplification; for instance, it abstracts from problems involved in the depreciation of fixed assets, which are considered below.

6. Speculative stockholding is left out of account.

augment the funds available to the company for distribution, taxation or investment. But this is not the end of the story, since in the traditional system this "gain" is liable to taxation along with other profit.[7] This means that stock appreciation exacts a net cost in terms of funds available to the company. Moreover, a proportion of the stock appreciation element in total recorded profit may well actually be distributed to shareholders.[8] Thus the tax and dividends payable on part (b) pre-empt some of part (a).[9] Looking at the same process slightly differently, T and C are based on P, even though only (P-A) is available for these transfers.

This argument may be restated and developed using these symbols:

P: conventional profits, as above

S: opening value of stocks

i: rate of inflation of stock values

t: rate of tax on profits (P)

c: proportion of profits (P) distributed to shareholders

Assuming that the physical volume of stocks is maintained, stock appreciation (A) is:

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7. The consequences for saving of the taxation of stock appreciation were recognised long ago by Keeling and MacPherson (1952).

8. This approach to dividends stems from concern with the single issue of managements' ability to finance investment: dividends are considered a "cost" as in the managerial theories of the firm (e.g. Penrose, 1959, p.28). Such treatment would be clearly inappropriate to, say, a discussion of wealth holders' income (see the discussion of stock appreciation and incomes policies below).

9. A comparison may be made with the situation affecting a house-owner when the nominal value of his house rises with inflation. If he moves to a similar house the holding gain resulting from inflation is realised, but immediately pre-empted; in contrast with the firm, however, he does not have to record the apparent gain as income, and consequently does not pay tax on it.

$i.S$ (2.i)

This represents the conventional profit which has to be paid out simply to maintain the physical volume of stocks. But tax and dividends are paid on the stock appreciation included in conventional profit: this additional burden equals:

$(t+c).i.S$ (2.ii)

Combining (2.i) and (2.ii) gives M, the total cash pre-empted from conventional profit, which may be attributed to the traditional inclusion of stock appreciation in profit:

$M = (1+t+c).i.S$ (2.iii)

The proportion of conventional profit pre-empted by this mechanism is shown by dividing by P:

$\frac{M}{P} = (1+t+c).i.\frac{S}{P}$ (2.iv)

This gives a multiplier, $(1+t+c).(S/P)$, relating the proportion of profit pre-empted to the rate of inflation. A typical value for this multiplier for the quoted company sector is obtained by inserting in (2.iv) average values for the sector in the late sixties:

$t = 0.4$

$c = 0.3$

$S/P = 2.5$

Thus, $(M/P) = (1+0.4+0.3) \times 2.5 \times i$

i.e. just 1% inflation in stock values would pre-empt 4.25% of conventional profit.[10]

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10. In contrast with the earlier discussion, which emphasised the ex post shares of income transferred to government and to shareholders, here, and in subsequent calculations, I use the nominal corporation tax rate and the average dividend payout rate gross of income tax; interest is excluded because it does not vary with profit. These definitions of c and t seem appropriate because different degrees of certainty attach to these charges on income here: companies may take stock appreciation into account/

The value of this multiplier highlights a problem for incomes policies in times of accelerating inflation. In seeking the compliance of both wage and profit recipients, such policies often make their target the maintenance of the shares of profit and of wages in national income. If the measure of profit for this purpose is to exclude stock appreciation (as does the C.S.O.'s) then each 1% increase in the rate of inflation has typically to be matched by a 3 or 4 percent increase in conventional profit for profit after stock appreciation to be maintained even in money terms. (For the purpose of incomes policy it would probably be appropriate to include dividends in disposable income, in which case the lower value of the multiplier (3.5) proposed in footnote 10 would be relevant). In other words, constant shares would imply that increases in conventional profit dramatically outpace increases in money wages. Since the negotiator at the level of the individual firm is likely to be well aware of changes in the company's conventional profit, but only remotely aware of the C.S.O.'s adjusted version for the whole economy, he is likely to be perplexed by this situation; and perhaps to be mildly sceptical of calls for restraint on the wages side. The need for reporting of inflation-adjusted profit by companies as a basis for an incomes policy has been neglected both by those who argue that income measurement is irrelevant to macro-

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10. Contd.

account in their dividend decision (and thus also reduce their income tax liability) while they cannot avoid corporation tax on stock appreciation. It might be questioned whether this average value for c is appropriate: some lower marginal payout rate might be preferable in years of rising profits (see the discussion of observed dividend behaviour in Lintner (1956)). But, using a marginal rate would not substantially alter the orders of magnitude: even if c were equal to zero, the tax rate, combined with the ratio of stock to profit, would still ensure a multiplier of 3.5 here.

economic behaviour (see Appendix A), and by those who are actively developing new measures of profit (see Appendix B).

This analysis of the relationship between inflation and stock appreciation is supported by Table 2.B. which presents estimates of actual (M/P) for 1961-72, dropping the assumption introduced for simplicity above, that physical stocks are always maintained.[11] There is an enormous range in the share of profit pre-empted by stock appreciation: taking the extreme values, it is over a third in 1970 compared with less than 5% in 1962. The rise in the rate of price increase during the period has caused a striking increase in the absolute value of M (documented in section e); and the average value of (M/P) is over 10 percentage points higher in the second half than in the first half of the period.[12] Inflation, via the stock appreciation mechanism, clearly made a major contribu-

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11. The method of the Central Statistical Office (1968) was used, except that a single general price index (the consumer price index) was applied to stocks, whereas the C.S.O. use specific price indices for individual industries, and for each component of stock. The information necessary to emulate the C.S.O. in these respects is not available for this population of companies (different from the C.S.O.'s). However, I did try to compare my estimates with those of the C.S.O. Unfortunately, the data are not readily comparable for individual years, but a comparison is possible for the whole 12 year period; and scaled down appropriately, the C.S.O.'s total estimate of stock appreciation for 1961-72 was within 1% of my total estimate. So I doubt whether my crude use of the single index significantly distorts the general picture for the aggregates.

12. The relationship between (M/P) and i does change between years, so that for instance, a rise in i in 1972 is accompanied by a fall in (M/P). The absolute value of M has varied closely with i, but changes in P (particularly in response to changes in the level of activity in the economy) sometimes offset these changes in M.

TABLE 2.B.

THE RATE OF INFLATION OF STOCK VALUES, AND THE PROPORTION OF CONVENTIONAL PROFIT PRE-EMPTED DIRECTLY AND INDIRECTLY BY STOCK APPRECIATION

Year	Rate of Price Increase %	M/P %
1961	3.8	17.5
1962	2.1	4.8
1963	3.2	14.0
1964	4.4	17.5
1965	4.2	17.7
1966	3.7	16.6
1967	2.2	11.3
1968	5.5	24.6
1969	5.1	23.3
1970	7.2	35.0
1971	6.7	30.5
1972	8.0	28.7
Averages:		
1961-66	3.6	14.7
1967-72	5.8	25.6

Rate of price increase = percentage rise in consumer price index from average date of purchase of opening stocks to average date of closing stocks (Central Statistical Office).

M = (1+t+c) x estimate of A (direct effect of stock appreciation)

t = nominal tax rate on company profit

c = average dividend payout rate gross of Schedule F income tax

Source and coverage: as Table 2.A.

tion to the divergence of P and R.[13]

d. Depreciation provisions and replacement costs

On the face of it, fixed asset replacement poses a problem similar to that for stock appreciation. It might be supposed that because of rising fixed asset prices, depreciation provisions based on historic cost would be inadequate to finance fixed asset replacement; part of conventional profit would then be pre-empted for asset replacement; and this pre-empted profit would nonetheless incur tax and dividends. So "disposable" profit would again be eroded.

The C.S.O.'s response to this problem is, in effect, to re-express companies' depreciation provisions in terms of current prices (giving capital consumption). The procedure is illustrated in case A of Table 2.C. There it is assumed, for simplicity, that a company's assets yield a constant flow of services for five years, and then die; that real investment is constant; that fixed asset prices are rising at 5% p.a.; and that depreciation is provided on a straight line basis. Because investment is constant, the sum of capital consumption in year 5 precisely equals the cost of replacing, at year 5 prices, those assets purchased in year 0 which now expire. But the sum of year 5's depreciation provisions, the figure set aside in companies' accounts, is inadequate to finance these replacement assets: the purchase of replacement assets pre-

13. M here includes part of T and C considered in section b, to illustrate the interaction of inflation and the conventions used in assessing tax liabilities and setting dividend payments. While section b concluded that T and C had not risen as a proportion of P, since, however, A has risen as a proportion of P, T and C have accounted for a larger share of (P-A) in the later part of the period.

empts 17.12 units of year 5's conventional profit. In such a case the argument is indeed analogous with that for stock appreciation.

However, this result can change crucially if real investment is growing. This is illustrated in case B of Table 2.C., which is in all respects similar to case A, except that real investment is growing at 8% p.a. The cost, in year 5, of replacing year 0's investment is the same (127.63); the excess of capital consumptionover companies' depreciation is slightly greater than in case A of Table 2.C.; but year 5's total historic cost depreciation provision is now more than enough to finance the replacement of year 0's investment: in fact 1.98 units of depreciation are left over.

More generally, if investment is on the increase, the cost of replacing those assets which expire in the current period will differ not only from the current year's depreciation provisions, but also from the year's capital consumption in current prices. Moreover, total current depreciation provisions can be more than adequate to finance current replacement investment, even though the depreciation provisions made over any asset's lifetime may never be adequate to replace that particular asset when it dies.[14] Despite inflation, no profit need be pre-empted.

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14. Depreciation may be even greater in relation to immediate replacement costs to the extent that companies adopt a reducing balance method of depreciating assets, which gives greater weight to recent purchases. This practice is not uncommon (see Chartered Accountants' Trust for Education and Research, 1972, p.30).

TABLE 2.C.

THE RELATION BETWEEN REPLACEMENT COSTS, COMPANIES' HISTORIC COST DEPRECIATION PROVISIONS, AND CAPITAL CONSUMPTION

Year	Price index at end of year	CASE A Nominal investment Real investment constant	CASE B Nominal investment Real investment grows at 8% p.a.
t	N_t	G_t	G_t
0	100.00	100.00	100.00
1	105.00	105.00	113.00
2	110.25	110.25	127.69
3	115.76	115.76	144.29
4	121.55	121.55	163.05
5	127.63		

	CASE A	CASE B
Historic cost depreciation		
provided in year 5 (D) =		
$\sum_0^4 Y_t$		
where $Y_t = 0.2 \times G_t$	110.51	129.61
Current cost depreciation		
for year 5 (= capital consumption, K)		
$= \sum_0^4 Y'_t$		
where $Y'_t = 0.2 \times G_t \times N_5/N_t$	127.63	148.65
Replacement cost		
in year 5 of fixed assets purchased in year 0 (I)		
$= G_0 \times N_5/N_0$	127.63	127.63

A paper by Domar (1953) specifies this relationship between replacement investment and depreciation provisions algebraically.[15] Domar obtains the general formula:

$$\frac{I}{D} = \frac{m(u+i)(1+i)^m}{[1+(u+i)]^m - 1} \qquad (2.v)$$

where: I: replacement cost of those assets now due for retirement

D: depreciation provisions (historic cost)

m: lifetime of fixed assets

u: annual rate of growth of real gross fixed investment expenditure

i: annual rate of increase of fixed asset prices

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15. An earlier version of this chapter relied upon specific examples to support the argument that follows. I am grateful to Mr. E. F. Jackson for referring me to Domar's more general work.

The relationship is derived as follows:

$$r = u + i \qquad (2.vi)$$

The capital stock (valued at historic cost) grows at a rate r, from an initial value, m years ago, of 1.

Its current total value (at historic cost) is the sum of the geometric progression:

$$1,\ (1+r),\ (1+r)^2,\ \ldots\ (1+r)^{m-2},\ (1+r)^{m-1}$$

$$\text{i.e. } \frac{(1+r)^m - 1}{r} \qquad (2.vii)$$

Depreciation in the current year, provided on historic cost, on a straight line basis, is 1/mth of the capital stock:

$$D = \frac{(1+r)^m - 1}{rm} \qquad (2.viii)$$

The cost of replacing the assets bought m years ago is:

$$I = (1+i)^m \qquad (2.ix)$$

$$\text{And so: } I/D = \frac{rm(1+i)^m}{(1+r)^m - 1} \qquad (2.x)$$

$$= \frac{m(u+i)(1+i)^m}{[1 + (u+i)]^m - 1} \qquad (2.xi)$$

This expresses the ratio of replacement costs to depreciation as a function of the lifetime of fixed assets, the rate of growth of investment and the rate of price increase,[16] with (I/D) varying inversely with u, but directly with i. This is exactly the relationship illustrated with the numerical example in Table 2.C., and it yields the same specific results as Table 2.C. The formula can be used to estimate on the one hand the level and, on the other, the trend in (I/D) for the U.K. quoted company sector.

Substitution in (2.v) of typical values for m, u, and i shows the order of magnitude of (I/D) for the sector. A value of 30 years for m was suggested by Domar, and more recent work does not make this appear unreasonable (see Dean, 1964, p.330).[17] The average rate of growth of real investment (gross domestic fixed capital formation at constant prices) between 1948 and 1972 was in the region of 4.5% p.a.; whilst the C.S.O.'s fixed asset price index has on average risen by roughly 4% p.a. during the period.[18] Substituting these estimates in Domar's formula (2.v) yields a value of somewhat below 80% for (I/D): the rate of growth of real

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16. The principal assumptions on which the formula rests are parallel with Table 2.C.: straight line depreciation; constant asset lifetime (m); and smooth and steady rates of growth of real investment (u) and of price increase (i).

17. Even were the shorter lifetimes reported by Shonfield (1965, p.42) for I.C.I. more common than this estimate of m assumes, the chief conclusion of this section would still hold. With m halved to 15 years, replacement still typically falls short of depreciation.

18. These approximations of i and u were derived from Table 16 and 55 respectively of Central Statistical Office (1972, and earlier years).

investment has in the event been sufficient to raise depreciation above replacement costs. According to these estimates, then, fixed asset replacement has not functioned in the same way as stock appreciation: far from pre-empting part of conventional profit, asset replacement costs have typically fallen short of companies' (historic cost) depreciation provisions, and part of depreciation has in fact been available for net investment.[19]

However, though historic cost depreciation provisions have typically augmented disposable profit during the period, rising asset prices will have contributed, along with the stock appreciation mechanism, to the downward trend in the ratio of disposable to conventional profit. Because of the positive relation between (I/D) and i, with the acceleration in the rate of fixed asset price increase from around 1969, (I/D) will, other things equal, have been rising, and the surplus of depreciation provisions declining. It seems unlikely that the increase in i has in fact been offset by changes in u and m: the growth of real investment (u) has actually slackened recently (see chapter 3). To some extent, changes in i and u may be

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19. With depreciation equivalent to about 35% of conventional pre-tax profits at this time, that fifth of depreciation left over after replacement corresponds to about 7% of profit. Merrett and Sykes' (1974) advocacy of current cost depreciation (capital consumption) in arriving at a profit measure appropriate for analysis and as a tax base entirely ignores the fact that historic cost depreciation probably still comfortably exceeds replacement costs; and that the "free" depreciation currently allowed for tax purposes will typically exceed replacement costs by an even greater margin (see Appendix A below).

    Glyn and Sutcliffe (1971) and (1972) also deducted capital consumption from profit; again, the figures they report (R) understate the level of effective savings available to companies for immediate investment.

expected to reinforce each other: a vicious circle can be envisaged whereby a rise in i increases (I/D) and the consequent squeeze on internal finance depresses u - a process which itself further raises (I/D). Even were u to remain stable at past levels, however, if the rate of inflation continues at the present double figure levels, (I/D) can be expected to rise above unity.[20 21]

It would be interesting to go beyond estimates of the order of magnitude and direction of change of (I/D) for the period by providing estimates for individual years. However, there would be problems in doing so; for the considerable fluctuations in gross investment which have actually occurred in the post-war period complicate the estimate of (I/D) for individual years. (I/D) becomes particularly sensitive to the choice of m, as the fluctuations in gross investment are echoed by replacement fluctuations m years later. Yet m itself is hard to estimate satisfactorily: separate estimates would be required for individual years, since the age structure of the assets to be replaced will vary from year to year simply in response to investment fluctuations in the past. These estimation difficulties could only be overcome if very detailed data on lifetimes and fluctuations were available. In any case, even the estimates

---

20. Domar (1953, p.11) shows that where m is 30 and u is 4.5% p.a. a value for i of less than 10% p.a. (over the asset's whole lifetime of course) is necessary to equalise replacement costs and depreciation.

21. This whole treatment, in line with the paper's central concern with disposable funds, concentrates on the cost of replacing the year's retirements, emphasising companies' actual cash flows, whereas the standard approach (capital consumption) estimates the part of assets of all vintages consumed during the year. This is not to say that capital consumption may not be the appropriate concept for some issues, such as, for instance, the estimation of wealth holders' income after capital has been kept intact.

of replacement costs already presented are subject to a major qualification. They rely on the assumption, as do the C.S.O.'s estimates of capital consumption, that fixed assets will be replaced with technically similar assets. By contrast, many treatments of asset replacement emphasise the role of technical progress (e.g. Salter, 1969, p.72; Shonfield, 1965, p.42); the incentive to replace comes not from the physical decay of old equipment, but from the superior efficiency of new; and consequently the distinction between new and replacement investment is blurred. Because of these objections to estimating replacement costs, the subsequent discussion of the level of companies' disposable income focusses on the funds available for new and replacement investment taken together.[22]

e. Quoted companies' aggregate saving

The foregoing discussion in terms of profit shares has identified inflation, operating through stock appreciation and rising fixed asset replacement costs, as the cause of the increasing difference between conventional and disposable profit. Now, in figure 2.A, the courses of the various components of profit are charted in absolute terms.

From the first part of the diagram it can be seen that pre-tax conventional profits in money terms (P) have risen in most years of the

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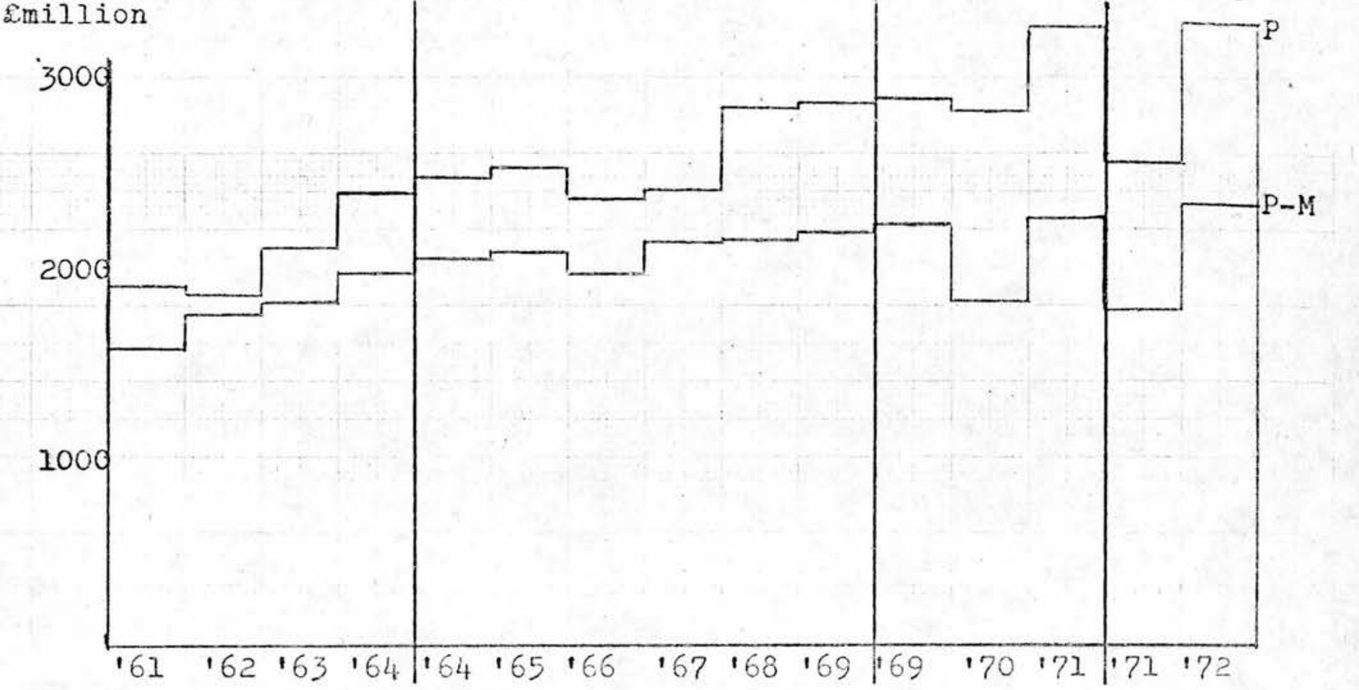
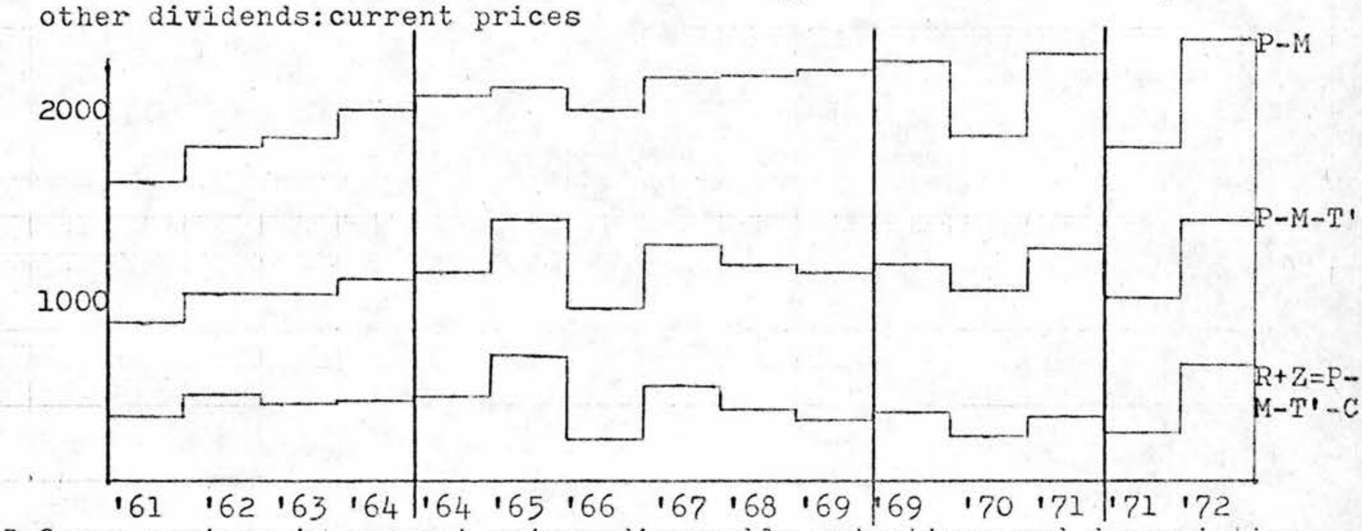
22. In Coddington's (1970) terms, such annual figures as could be provided here would be very "soft" numbers: derived from unreliable data and hazy concepts, they could be very misleading.

FIGURE 2.A. The components of profit:quoted companies,1961-72

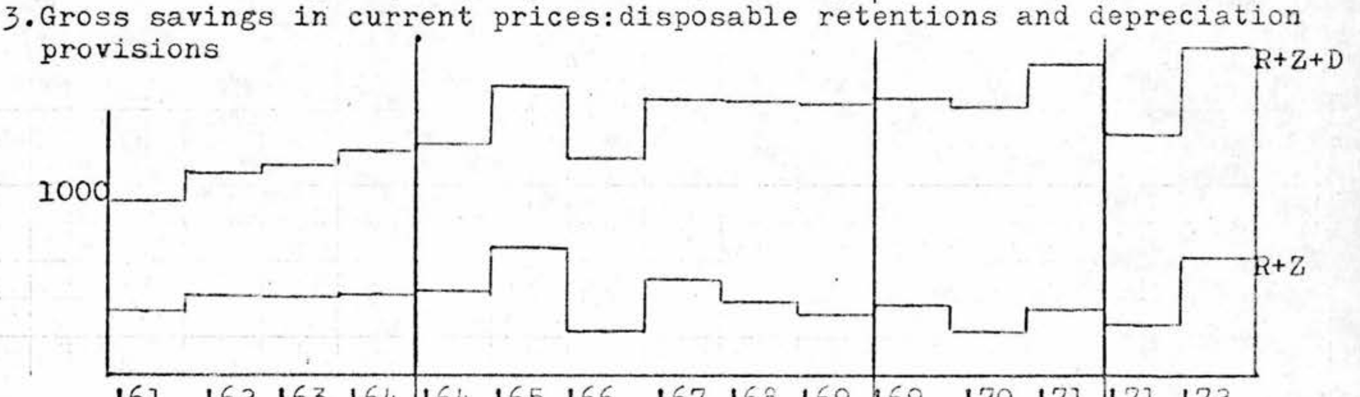
1.Conventional profits and the impact of stock appreciation:current prices



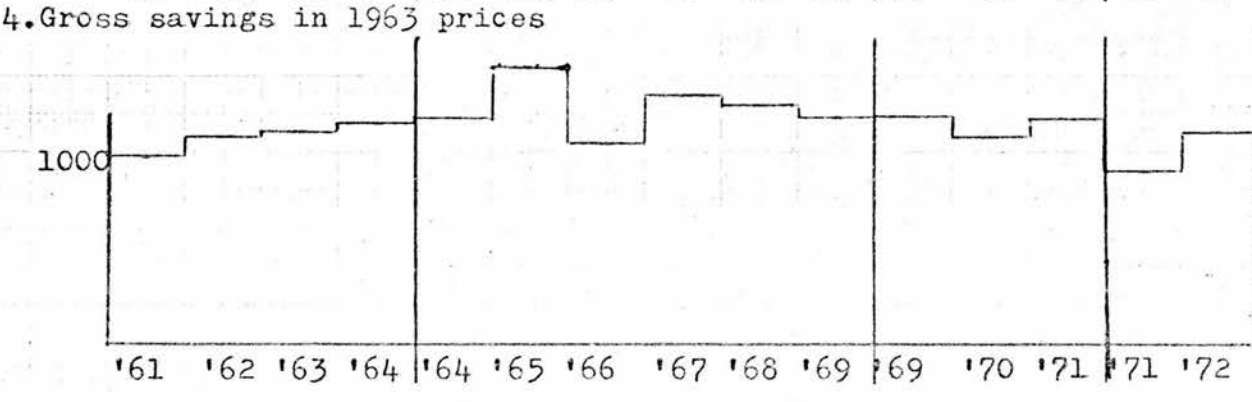
2.Profits after full adjustment for stock appreciation,other tax,and other dividends:current prices



3.Gross savings in current prices:disposable retentions and depreciation provisions



4.Gross savings in 1963 prices



Source: as Tabl 2.A.

period, though they suffered slight setbacks in 1962, 1966 and 1970. However, with the acceleration of inflation in the late sixties, profits adjusted for the full effects of stock appreciation (P-M) show a rather different picture. For instance, between 1967 and 1968, a rise in P of over £400 million was accompanied by a rise of only £6 million in (P-M), thanks largely to an increase in the inflation rate.[23] Again, a rise in the inflation rate in 1970 aggravated the fall in profit: a £70 million decline in P was converted into a £400 million decline in (P-M).

The second part of the diagram shows the impact of "other tax" (T') and "other dividends" (C') on (P-M). These items are defined as in section b, except that they exclude the tax and dividends already counted as indirect costs of stock appreciation and included in M (see section c). The resultant retentions figure (R+Z) fluctuates somewhat, especially on the change in the tax system in 1965-66; but, even in current prices, it is typically lower in the second half of the period than in the first half. In view of the argument in section b that the shares of tax and dividends did not rise over the period, it might seem odd that a slight upward movement in (P-M) is associated with a downward movement in (P-M-T'-C'). This is explained by the facts that loan interest accounted for an increasing proportion of C over the period, and that since interest does not vary with profit, it was not included in M as a secondary

---

23. Of course, (P-M) is only an approximate estimate and the figures mentioned should not be interpreted too precisely: but they do illustrate orders of magnitude.

effect of stock appreciation. So the "dividend" component of M falls and "other dividends" (C'), which include interest, rise over the period.

In the third part of the diagram, companies' depreciation provisions (D) are added back to (R+Z), to give a figure for gross savings at current prices available for new and replacement investment. In contrast with (R+Z), D rose in every year of the period. Indeed, because of the general rise in real investment expenditure (see section d), even at 1963 prices (not shown) depreciation provisions increased in every year but two of the period, and by 1971 were more than 50% higher than in 1961. However, because of the decline in (R+Z) (accentuated in 1963 prices), when the joint total (R+Z+D) is expressed in 1963 prices ($(R+Z+D)^*$ in part 4 of the diagram), such buoyancy is no longer apparent. The total for 1971 is only 20% higher than that for 1961, and is lower than the typical figure for the mid-sixties. Finally, the full impact of inflation becomes evident if this real gross savings figure, $(R+Z+D)^*$, is compared with nominal conventional profit (P) in part 1 of the diagram: the increases in P in 1967-69 are converted into decreases in $(R+Z+D)^*$ (which represents the inflation-adjusted inflow of internal funds available for the replacement of fixed assets and for expansion); while the considerable rise in P in 1971 and 1972 is accompanied by relatively tiny increases in $(R+Z+D)^*$. Moreover, it is likely that an even sharper contrast would result if only net savings were considered (although, for the reasons given above, a precise estimate is elusive), for it has been argued in section d that, because of the general expansion of investment in the post-war period, the real costs of replacing fixed assets will surely have been rising; and so the squeeze on net savings will have been even more severe than that demonstrated for gross.

Evidently, the contention that the late sixties did not witness a serious decline in companies' internal funds available for investment does not hold; and if Panic and Close or King maintain the opposite they are suffering from profit illusion. The seeming buoyancy of conventional profit was illusory: the savings squeeze was a reality in the late sixties, and in assessments of any recovery in savings in the early seventies, the upturn of conventional profit should be heavily discounted.

As to why profits were such that net savings did decline as inflation rose, a tentative suggestion might be made here. When increases in the general level of activity are only sluggish, there is evidence that conventionally-measured profit margins stagnate or fall as managers maintain prices in the face of rising unit costs (Neild, 1963). Again, in times of inflation, if managers are susceptible to profit illusion, as some observers seem to have been, then they may fail to recoup the rising replacement costs of inputs through pricing policies, because conventionally recorded profit (based on the historic cost of inputs) appears satisfactory. These two influences, acting together in the "stagflation" years at the end of the sixties, may be sufficient to explain the aggregate saving squeeze, presenting a challenge (or perhaps a complement) to other accounts, which, for instance, emphasise the role of increased international competition (Glyn and Sutcliffe, 1971 and 1972). But this is only speculation.[24]

f. The uneven impact of inflation on different industries' disposable profits

So far, attention has been focused, as has the debate in the literature, on the aggregate record of the company sector. However, particularly striking results emerge from an extension of the analysis to compare the experience of different industries.

To consider first the impact of stock appreciation across industries: equation (2.iv) of section c above provided a multiplier relating the proportion of conventional profit pre-empted by stock appreciation to the rate of inflation:

$$\frac{M}{P} = (1 + t + c).\frac{S}{P}.i$$

(M/P) has been calculated for each of the 22 broad industrial groups represented in the aggregates for 1970, the most recent year for which suitable data were available; as well as one which experienced an inflation rate typical of the early seventies. A single price index for stocks was used for want of specific indexes for individual industries. The estimates thus isolate influences on (M/P) other than different industry rates of stock price inflation.[25]

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24. If managers do indeed suffer from profit illusion, this would, of course, influence their incentive, as opposed to ability, to invest.

25. It seems unlikely that different rates of inflation would systematically compensate for variation in multiplier values, and so significantly alter the range of the results; though individual industries may well have experienced rather different rates from the average used, so no great reliance should be placed on individual values. The aim is, again, simply to suggest likely orders of magnitude.

Otherwise actual values were used. On this basis, the variation in the multiplier across industries arose chiefly from different ratios of stock to profit, rather than from different tax or dividend payment rates. The term (1 + t + c) exhibited relatively little variation across industries: t is uniform, and c, the average payout rate varied only between .28 and .40 for 20 of the industires:[26] for these industries the lowest value for (1 + t + c) was 93% of the highest. However, for the same 20 industries, (S/P) varied between 0.5 and 4.8: here the lowest value was only 10% of the highest.

Section c above showed the typical order of magnitude of the stock appreciation multiplier and its impact on aggregate effective profits. Figure 2.B illustrates the effects of the considerable variety in the multiplier's value between industries: it shows (M/P), the proportion of conventional profit pre-empted by the stock appreciation mechanism. The range is huge: from 5% to 72% (ignoring ship-building and vehicles for which M exceeded P - see above). In addition, for 12 of the 22 industries the "cost" appears as 40% or more of P. In a sense, the stock appreciation mechanism amounts to a "levy" on stockholdings which reduces liquidity, discriminating severely against those industries which carry large stocks in relation to their profits.

Of course, this is not the whole picture. In particular, in view of the discussion of aggregate experience, one naturally asks how the relationship between replacement costs and depreciation will

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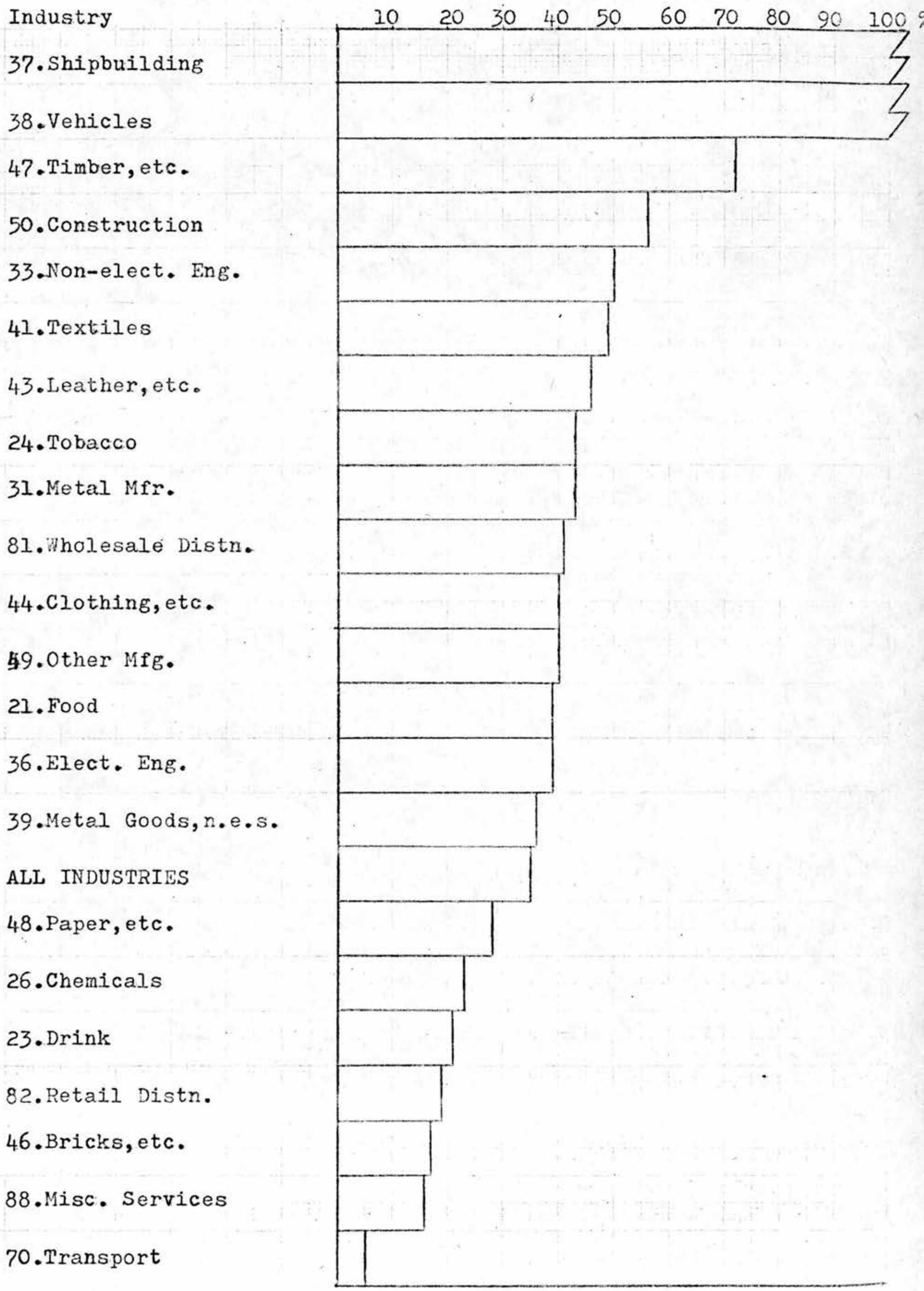
26. The remaining two industries, shipbuilding and vehicles, aberrated on account of negative and tiny profits, respectively.

FIGURE 2.B. Stock appreciation plus tax and dividends payable on stock appreciation (M) as a percentage of conventional profits (P):1970



Source:as Table 2.A.

have varied between industries. However, it does not seem feasible to present even suggestive estimates in this case, because of the lack of detailed information. For the relationship will depend here on industry rates of growth of annual investment, rates of price increase, and lifetimes of fixed assets: but whilst industry rates of price increase are not available - the problem already encountered for stock appreciation - neither in this case are the lifetimes of fixed assets for different industries. Moreover, the general problem with such estimates, of distinguishing new and replacement investment, will surely be acute in comparisons of different industries with different rates of technical progress. Hence any estimates might be grossly misleading, and this question remains unanswered.

h. Summary and conclusions

Are profits being squeezed? No, on one measure, conventional accounting profit; yes, on another, the funds retained by the firm and available for investment.

This chapter shows how, in times of inflation, conventionally measured profit will belie companies' ability to invest from internal funds: inflation, working through stock appreciation and rising fixed asset replacement costs, rather than increasing shares of tax and dividends in conventional profit,[27] is identified as the main contributor to the divergence between conventional and disposable profit in recent years.

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27. Though of course, as a share of profit less stock appreciation, tax and dividends rose over the period.

The effect of stock appreciation is dramatic. If managements wish to maintain their companies' purchasing power, it is not enough that nominal earnings keep pace with the rise in prices, as it is for wage or dividend recipients. In addition, increases in conventional profits have to match increases in stock appreciation; and since stocks are, on average, two or three times earnings, earnings must also rise by a multiple of any increase in the inflation rate, if disposable profits are to be maintained. Moreover, paradoxically, continued use of the inflated conventional profit measure that includes stock appreciation actually itself reduces the ratio of effective to conventional profit: for so long as conventional profit is still used as a tax base and, one presumes, in the determination of dividends, the effect of the stock appreciation mechanism on the internal funds available for investment is aggravated.

What is more, in recent years the impact of stock appreciation has not only been drastic for aggregate disposable profits but has also discriminated severely between industries. This means that the effective tax on profits after stock appreciation varies a good deal from one industry to another. If it is believed that this discrimination restrains the investment of certain industries in an undesirable way, there is perhaps a case for reducing the tax bill of industries with much stock appreciation at the expense of those with low stocks in relation to profits; that is, for relieving stock appreciation of tax and (assuming that aggregate tax revenue is to be unchanged) raising the standard rate.[28]

Returning to the aggregate picture, the downward trend in real disposable funds already brought about by stock appreciation was almost certainly reinforced because, during the period, historic cost depreciation provisions probably declined in relation to the cost of replacing current retirements. However, these replacement costs probably never exceeded depreciation provisions and actually preempted conventional profit.

Thus, in spite of an apparently satisfactory record in the late sixties in terms of traditional profit, the real saving of the quoted company sector declined from 1967 to 1970; and the recovery in real saving in the early seventies is much less vigorous than the movement of conventional profit might suggest.

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28. Whether conventional profit is a desirable tax base is one of the topics to be investigated by the Sandilands Committee on Inflation Accounting (I.A.C.). Against the objection that this would imply a radical change in the tax system, I would cite the argument of Parker and Harcourt (1969, p.27) that the change would only restore the basis which obtained in times of mild inflation.

    The accounting institutes are of course well aware of the need to adjust accounts for inflation, and have developed proposed adjustments (see Appendix B); though they have not recommended that their suggested alternative measure of inflation-adjusted profit be adopted for tax assessment. However, not only has the I.A.C. to consider the implications of inflation for company taxation, but also the Budgets of November 1974 and April 1975 granted temporary tax relief to companies on all but a small part of any stock appreciation (see section a. of Appendix B): this relief will be reviewed when the I.A.C. has reported to the government.

CHAPTER 3

Savings and Investment 1 : Background to a Model

(a) Introduction[1]

In a world of perfect foresight and perfect capital markets, there would be no special reason for the investment decisions of the firm to be sensitive to the internal finance currently generated by its own operations. The profit-maximising company would undertake any investment yielding a return which exceeded the market rate of interest. The influence of internal finance intrudes both as a result of market imperfections (such as transactions costs which make external finance more costly than retentions) and in a world of uncertainty where there exists the possibility that an investment project might fail. In a large manager controlled company where the directors have little equity interest in the firm, the gains to the directors from a large successful expansion are limited[2]; at the same time the threat to the manager's security from losses on a new investment project is greater if investment is extended to the point where external funds are needed to supplement retentions. If the external

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(1) At several stages in the next two chapters references are made to the work of Meyer and Kuh (1959). In fact the whole approach as well as some of the detailed arguments owes a good deal to their work.

(2) True, they may expect salary gains as a result of expansion (see Appendix E); but as Chapter 10 argues, salary increases are perhaps more readily and safely realised by growth by merger than by new investment.

In smaller, owner-controlled companies, the directors may themselves realise larger gains from major expansion; but new issues are a relatively costly form of finance for such companies (see Davis and Yeomans (1975)).

finance comes from debt issues, the company commits itself to future interest payments on the additional capital; and the failure of this additional capital to realise a rate of profit at least equal to the rate of interest implies a fall in shareholder earnings[3] and possible loss of office for directors. Similar consequences will also arise where new equity finance is used, the project fails, and the expectation of increases in aggregate earnings prompted by the new issue is unfulfilled. Again, if the director has little equity interest, he will not be reluctant to forgo dividends in favour of retentions. Thus, for the manager, retention finance is in a sense costless, involves little outside scrutiny of his plans and activities, and is relatively risk-free.

According to this account then, the manager wishing to avoid the opprobrium attaching to a decline in shareholder income, will only resort to external finance when he is specially confident of the returns offered by the new project; and, in Galbraith's words, "to minimise dependence on (the capital) market is ... a universal planning strategy".[4]

Table 3.A illustrates the average contribution of internal and long-term external sources of finance to company expansion in

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(3) See Lintner's (1956) study of dividends for a discussion of managers' reluctance to report a decline in shareholder income.

(4) For fuller arguments on the importance of retentions, see for example, Baumol (1965), Galbraith (1972), Kaldor (1971), Marris (1964), as well as Meyer and Kuh (1959).

the period 1964-71. Expansion by takeover financed through share for share exchange is left out of account in the table: part 2 of the thesis suggests that special considerations may affect the financing of that component of growth.[5] Total expenditure on the other components, namely gross new investment in fixed assets, purchases of new subsidiaries for cash, and the accumulation of net current assets[6] represented 13% of opening net assets in the typical company-year; and of this the vast majority (10.7%) came from internal sources. Thus the relatively weak reliance of the average company on external finance is consistent with the argument that managers have a strong reluctance to expand using external finance.

An alternative situation would, however, be consistent with the picture given in Table 3.A. The major role of internal sources in relation to investment on average may conceal a very different situation for individual companies. For some, saving may greatly exceed investment, while for others the reverse would hold. Investment could then be determined almost entirely by factors on the incentive side, with firms indifferent between internal and external sources of finance.

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(5) See especially Chapters 9 and 10.

(6) This heading on the uses of funds side, and retentions on the sources, incorporate stock appreciation.

TABLE 3.A

Internal Finance and Expansion (1964-1971)

	% p.a.
Form of Expansion (Uses)	
Growth of net assets other than by takeovers which were externally financed (a)	7.5
Expenditure on "replacement" investment (≑ depreciation)	5.5
Total gross investment in new fixed assets, purchases of subsidiaries for cash, and accumulation of net current assets:	13.0
Method of Finance (Sources)	
Depreciation provisions	5.5
Retentions	5.2
Total Internal Sources:	10.7
Long-term external finance	2.3
Total:	13.0
Number of companies	966

Notes:

Figures represent flows for each company-year expressed as a percentage of the company's opening net assets, and averaged across all companies in the population and all years in the period (the averages are unweighted).

(a) This comprises the rate of growth of net assets (11.8) minus takeovers financed with new issues (3.2) minus the portion of new subsidiaries represented by minority interests and long-term liabilities (1.1).

See Appendix F for fuller definitions.

Thus a more satisfactory account of the influence of saving on investment, and hence of the role of the savings squeeze documented in chapter 2 in restraining investment, requires a model which incorporates both candidate sets of determinants, representing the incentive and the ability to invest, and which can be estimated to provide some basis for discriminating between the alternative accounts. The rest of this chapter and chapter 4 are devoted to estimating such a model in cross-section for U.K. companies in the period 1967-71.(7)

(b) The Choice of Variables to Represent the Incentive and the Ability to Invest (8)

Chapter 2 emphasised the difficulty of distinguishing between new and replacement investment, and so the model used below has gross investment as its dependent variable.(9) The first

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(7) Time series analysis of company accounts along those lines is not possible because a crucial variable on the incentive side, sales, only became universally available in company accounts after the 1967 Companies Act.

(8) Most of these correspond to the variables chosen by Meyer and Kuh for intensive analysis after they had examined with correlation analysis the influence on investment of a much larger number of potential explanatory variables. See Meyer and Kuh (p.64) for further discussion of the properties of variables common to both studies.

(9) Fixed assets purchased in the course of takeover are excluded (see Appendix D). Investment grants netted out of fixed asset purchases in company accounts are added back by the D.I. as part of their standardisation procedure.

explanatory variable on the incentive side focusses on the replacement element in gross investment: it is an indicator of the age of the company's capital stock, namely the ratio of its total depreciation reserve to its gross fixed assets. The rationale for including such a variable is that replacement investment will be prompted by the decay of the stock of capital equipment as the average age of assets rises. Thus, of two otherwise similar companies, the one with the older capital stock might be expected to undertake more replacement investment. This particular measure is clearly imperfect, given variations between companies in accounting policies with respect to depreciation rates, in the proportion of undepreciated land and buildings in total fixed assets, etc. But it is the best available at the company level.

Secondly, a measure of capacity utilisation was developed for each firm, using an invention of Meyer and Kuh. The peak output - capital ratio (sales: Gross fixed assets) of each firm during the five years studied was obtained; and the current year's output - capital ratio was expressed as a proportion of this yardstick. According to simple accelerator type theories of investment, technical conditions will favour some fairly stable output - capital ratio, and a rise in output from a level where the ratio was considered satisfactory will prompt a demand for more capital. In cross-section, the company producing at or near capacity is more likely to expand capacity in response to an increase in demand (also represented in the model: see below) than one with substantial unused capital equipment.

The remaining two variables on the incentive side are the sales level and the increase in sales from the previous year. Not only do these represent the influence of the accelerator effects embodied principally in the capacity utilisation measure, but they are likely also to mould expectations of sales as well as of profit, given the positive relation between the level of output and that of profits.(10)

Three variables are used to represent the influence of internal finance on the investment decision - two liquidity flows and a liquidity stock. The first is the net disposable retentions measure developed in chapter 2 (R + Z): profit after depreciation, tax, dividends, interest and stock appreciation. This is, of course, the variable which has suffered so severely on account of the failure of conventional profit to keep pace with stock appreciation. The problem discussed in

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(10) See section 2.E above on the relation between the level of activity and the level of profits.

Conventional profits were not themselves incorporated in the model because they are relatively highly correlated with sales on the incentive side and disposable retentions on the finance side: it is likely that their inclusion in the same model as these two would have led to problems of multicollinearity; and anyhow it would have been difficult to distinguish its influence as an incentive factor (reckoned here to be represented by sales) or as an ability factor (better represented by disposable retentions, according to the argument of chapter 2). Sales and disposable retentions do not display a very high correlation (see Appendix G, Table G.I).

chapter 2, of finding an appropriate price index to compute the value of stock appreciation, is acute at the individual firm level. *Faute de mieux* a general (consumer) price index has been used; but to avoid serious error the value of stock appreciation is constrained to be less than or equal to the increase in the nominal value of stocks (i.e. the actual cash spent on increasing stocks).(11) To the extent that managers make allowance for inflation in assessing their current profit(12) or else that this net saving measure is closely correlated with profit on the historic cost basis, this variable may also have an incentive element.

The second variable on the ability side is relatively free of the incentive component: this is current depreciation provisions, the other element of gross savings, apart from (R + Z), in Table 2.A. It is a pure liquidity flow variable, being a function only of the capital stock and of the write-off policy. And as Figure 2.A and Table 3.A show, it has contributed a major proportion of gross savings.

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(11) This constraint is consistent with the central concern here with cash flow and its effect on investment. It would not necessarily be desirable if some measure of real profit was wanted to represent the incentive to invest (see chapter 2 above on this distinction).

(12) Panic and Close (1973) suggest that firms typically based their investment decisions on historic cost accounting information in the period under study.

Finally, a liquidity stock variable,[13] bank balances plus near cash, minus bank borrowing, etc. is incorporated on the grounds that large stocks of liquidity will relax any constraint upon investment that is imposed by any curtailment of liquidity flows.

(c) The Model

Thus the basic model may be summarised:[14]

$$I_{ij} = f\ (A_{ij-1}/K_{ij-1}, U_{ij}\ /K_{ij-1}, S_{ij}, \Delta S_{ij}, R_{ij}, D_{ij}, C_{ij-1}, e_{ij})\quad (3.i)$$

where:

I = Gross investment in fixed assets.

A Accumulated depreciation (indicator of average age of capital stock when divided by K).

U Sales times minimum capital-output ratio for period (indicator of level of capacity utilisation when divided by K).

S Sales

R Disposable retentions ((R+ Z) in the terms of chapter 2).

D Depreciation provisions.

C Net liquidity stock.

K Gross fixed assets.

e Error term

i i th company

j Current year.

Because of the enormous range of company-size in the population studied (the largest is of the order of 1000 times the size of

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(13) This comprises cash and bank balances plus tax reserve certificates and marketable securities, minus bank overdrafts and loans, dividend, interest and current taxation liabilities.

(14) See Appendix F for detailed definitions of variables. Current values of the variables are used in all cases except the age indicator and liquidity stocks where the opening balances are used. These exceptions are made because in both cases investment may be expected to affect directly the closing balances of the respective variables (assuming other things equal). See the discussion below of alternative results when the flows were lagged one year.

the smallest) the problem of heteroscedasticity arises when such a model is estimated for cross-section data. Accordingly the actual version used deflates all the variables except those already so deflated (A, U) with the size measure, gross fixed assets (K):

$$\left[I_{ij} = f(A_{ij-1}, U_{ij}, S_{ij}, \Delta S_{ij}, R_{ij}, D_{ij}, C_{ij-1}, e_{ij})\right]\frac{1}{K_{ij-1}} \qquad (3.ii)$$

This formulation of the model presumes that causation runs from the independent variables selected above to investment. Where both variables relate to the same period, however, the reverse could sometimes be true. A more efficient replacement machine or factory could raise profitability (and hence savings), in the year it was brought into service; and even where it was no more efficient than existing equipment, additional capacity could raise sales and profits in conditions where production had fallen short of demand at the prevailing prices.(15)

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(15) Of course the other famous argument for the reverse causation comes in Kaldor's (1955) macro model of income distribution. There, given stable savings propensities for capitalists and workers, and the capitalists' propensity greater than the workers', the share of profit in national income is positively related to the share of investment in national income. If this relationship holds it should nevertheless not affect these micro results which are concerned with explaining the deviations of observations from the mean. In a year of high average profits and investment, there is nothing in Kaldor's account to ensure that particular companies with high investment will have specially high profits as a result. He is concerned, rather, with balancing conditions for the whole economy: for full employment equilibrium higher investment means that consumption must be lower, and in the absence of other equilibrating conditions, the average price-wage ratio and hence aggregate profits must be higher.

Here the presumption is justified on the grounds adduced by Meyer and Kuh (p.82): regression analysis will uncover investment as a function of, say, sales rather than vice versa, since the former relationship is reckoned to be much the more stable of the two. The volatile shifts in the sales function are reckoned to trace out the more stable investment function.(16)

(d) The Data, the Population and the Stratification of Observations

The data are those used throughout the thesis: the published accounts of U.K. quoted companies, standardised by the Department of Industry. Appendix F details the origins and coverage of the data. Although the Data Bank contains such accounts for every year from 1948 to 1971, and earlier years are used in the analysis for other parts of the thesis, the model is in this case estimated for only the last five of the available years, 1967 to 1971. This is because the sales data necessary for three of the explanatory variables on the incentive side (U, S, ΔS) were only disclosed by all companies after the 1967 Companies Act.(17)

The model is estimated separately for eighteen individual

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(16) See the parallel argument on the identification problem in chapter 9, footnote 4.

(17) Thus for 1966, 48.5% of the population studied in this and the next chapter published their sales total; 83.8% in 1967; 99.7% in 1968 and 100% subsequently. Where a company has no sales data it is excluded from the computations reported below. This distorts certain comparisons between years when different proportions of the population are included.

two-digit industries. Although this causes a proliferation of results and increases the difficulties of presentation, it was thought necessary because so many factors which affect investment, but which cannot readily be measured and incorporated explicitly into the model, are associated with industry - e.g. the durability of capital equipment and product, production and market structure, trade credit practices, etc. These variables may well affect the extent and speed of response of investment to the explanatory variables actually included; and in fact considerable differences do emerge in the performance of the model for different industries within the same year. Thus 90 sets of results are provided for the model (5 years x 18 industries): the number of companies contributing to each industry-year is recorded in Table 3.B.

Chapter 4 provides multiple linear regression estimates of model 3(ii). This single and relatively simple specification is relied upon for two reasons. Firstly, since the stratification scheme yields 90 estimates of the model (and hence with seven explanatory variables and a constant term, 720 coefficients per specification), more than a very few specifications would present serious presentation problems. Secondly, only a limited aim is being pursued here: to judge whether investment was sensitive to savings in the late sixties, and hence whether the savings squeeze documented in chapter 2 mattered on this score. This limited exercise is probably adequate for this task, whereas the development of different specifications of the relationships would be desirable were the aim an exhaustive test of alternative theories or forecasting.

One very plausible alternative version of the model would lag the independent variables; for some delay is clearly inevitable between the stimuli to invest, the commissioning of a project, and the purchase of equipment. Accordingly, the model was estimated using all the independent variables but A and C (which represent opening stocks anyway) in a form where they were lagged one year. On an (admittedly crude) comparison, however, this variant performed less well than the 'current' model: R^2 was higher for the current version in 78% of industry-years. In the interests of simplicity, therefore, only the current version is reported in subsequent sections.

(e) A Survey of the Data

Figures 3.A to 3.H summarise the average values of the 8 variables (7 explanatory plus investment) used in the model (each variable is in its deflated form - i.e. as a proportion of gross fixed assets). The procedure adopted in each diagram has been to provide five frequency distributions of the eighteem industry means for the respective variable - one for each year.(18) The main purpose of the diagrams is to provide

(18) Individual values for each industry-year are reported in Appendix G, Tables G.A to G.H.

TABLE 3.B

Industry Distribution of Companies included in the Regression Analysis

	Industry	No. of Companies
21	Food	30
23	Drink	49
26	Chemicals	49
31	Metal manufacture	43
33	Non-electrical engineering	119
36	Electrical engineering	54
38	Vehicles	31
39	Metal goods, n.e.s.	70
41	Textiles	71
44	Clothing and Footwear	33
46	Bricks, Pottery, etc.	40
47	Timber, etc.	32
48	Paper, printing, etc.	59
49	Other manufacturing	39
50	Construction	57
81	Wholesale distribution	78
82	Retail distribution	82
88	Miscellaneous services	49
	Total:	985

Note: Four industries (tobacco, shipbuilding, leather and transport), which contain very few companies were excluded from the analysis, since they would have enjoyed few, if any, degrees of freedom.

a comparison of the individual years being studied.

Of the four variables on the incentive side, it is the two embodiments of the accelerator principle (capacity utilisation and change in sales) which reveal the sharpest contrasts between years (see Figures 3.B and 3.D). 1967, the year of balance of payments crisis and stagnant manufacturing output[19] contains the lowest values of all. After the devaluation at the end of 1967 and with the improvement in world trade in 1968, however, aggregate manufacturing output, led by exports, rose by some 6% in real terms in 1968 (CSO (1972) Table 15). The variables derived from companies' accounts and reported in the diagrams fully reflect this: the averages for both capacity utilisation and sales increase are typically at their highest in 1968 of the whole five years. The subsequent two years of Jenkins retrenchment and modest rises in aggregate real output witnessed only middling levels of the two variables reported in Figures 3.B and 3.D. And the final year, in which aggregate output was again stagnant, produced typically lower levels for the change in sales, and a broadening of the distribution for the capacity utilisation indicator.[20]

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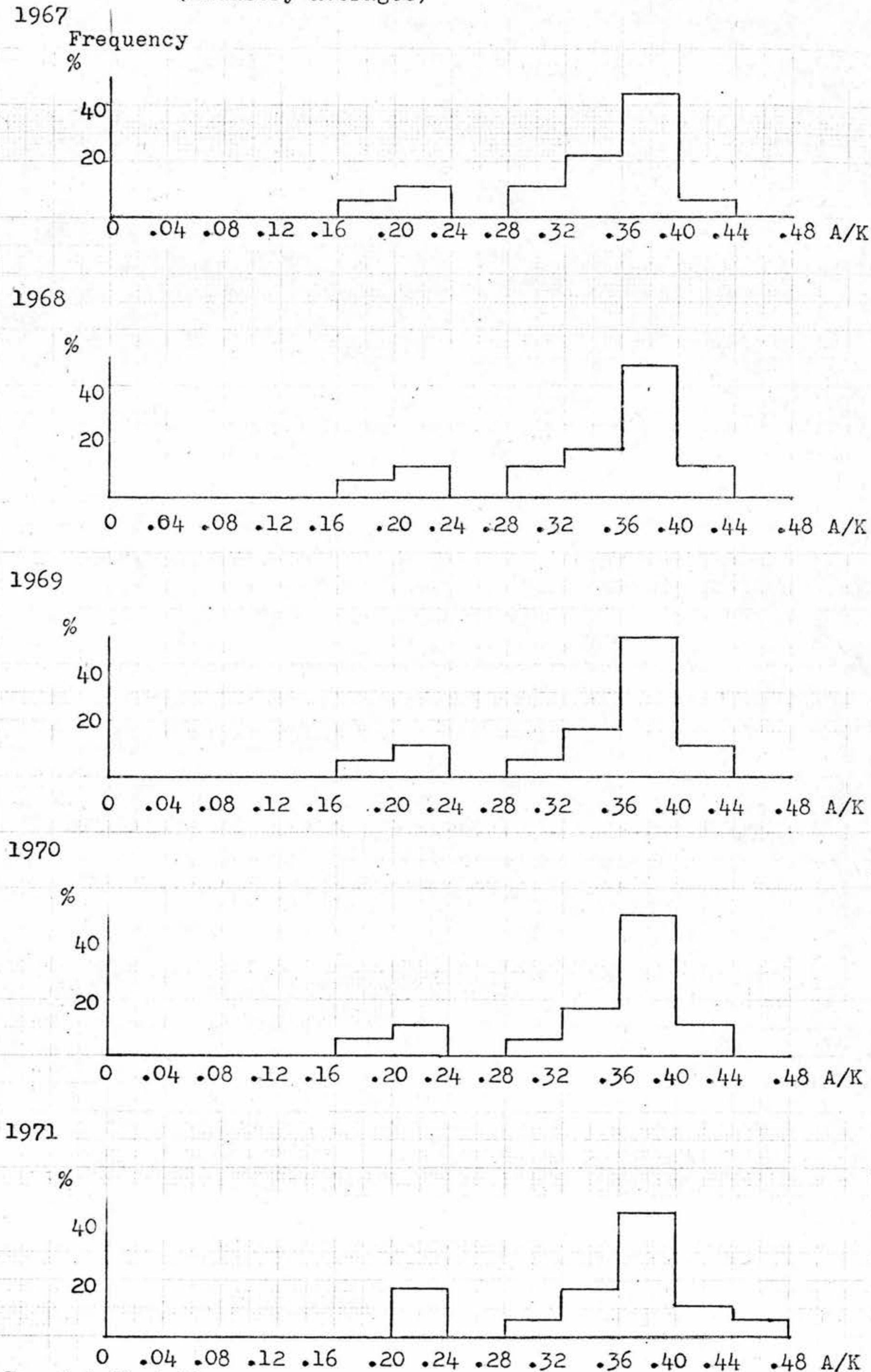
(19) Expressed in constant prices, manufacturing output showed no increase at all in 1967 over 1966: see Central Statistical Office (1972), Table 15.

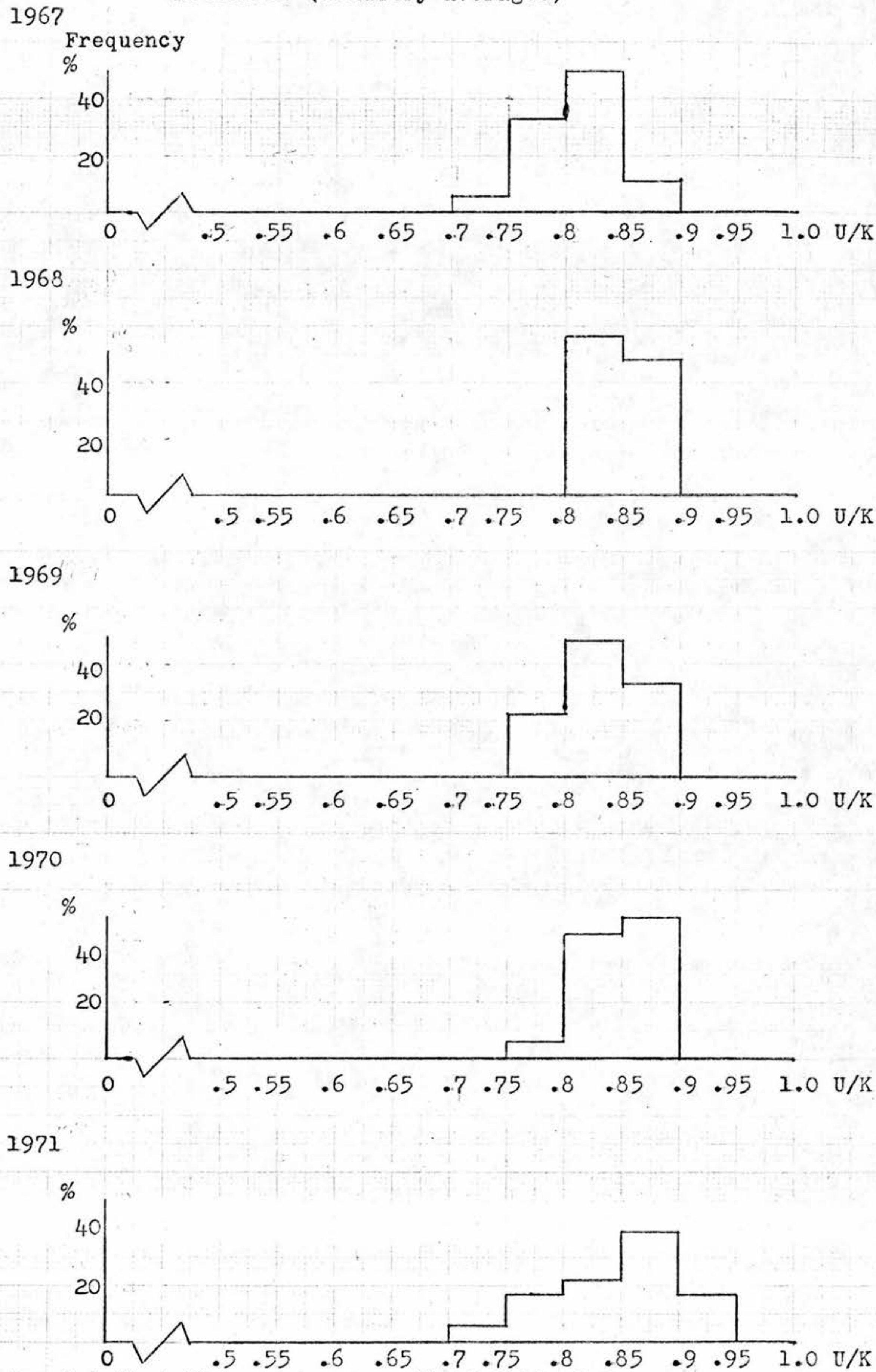
(20) The persistent inter-industry differences in the dependent and the explanatory variables reported in Appendix G vindicate the stratification by industry - for instance the drink industry has persistently low average values for sales and investment, while construction and wholesaling have values above the population average for both. Inter-industry differences would doubtless merit detailed study themselves: some account is taken of them in the interpretation of regression results in chapter 4.

FIGURE 3.A. Frequency Distributions of the Age Indicator (industry averages)



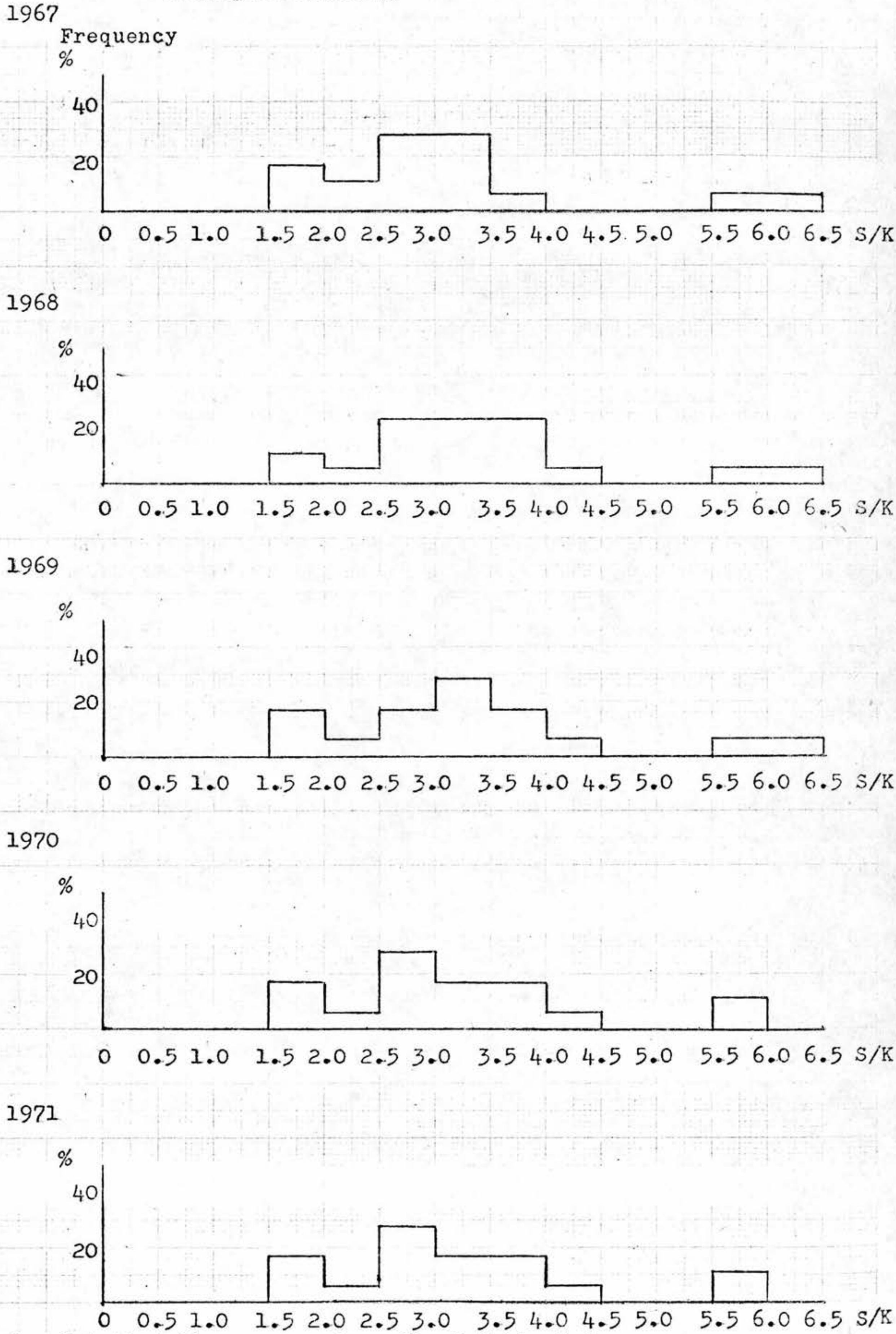
For detailed figures, see Appendix G, Table G.A.

FIGURE 3.B. Frequency Distributions of the Capacity Utilisation Indicator (industry averages)



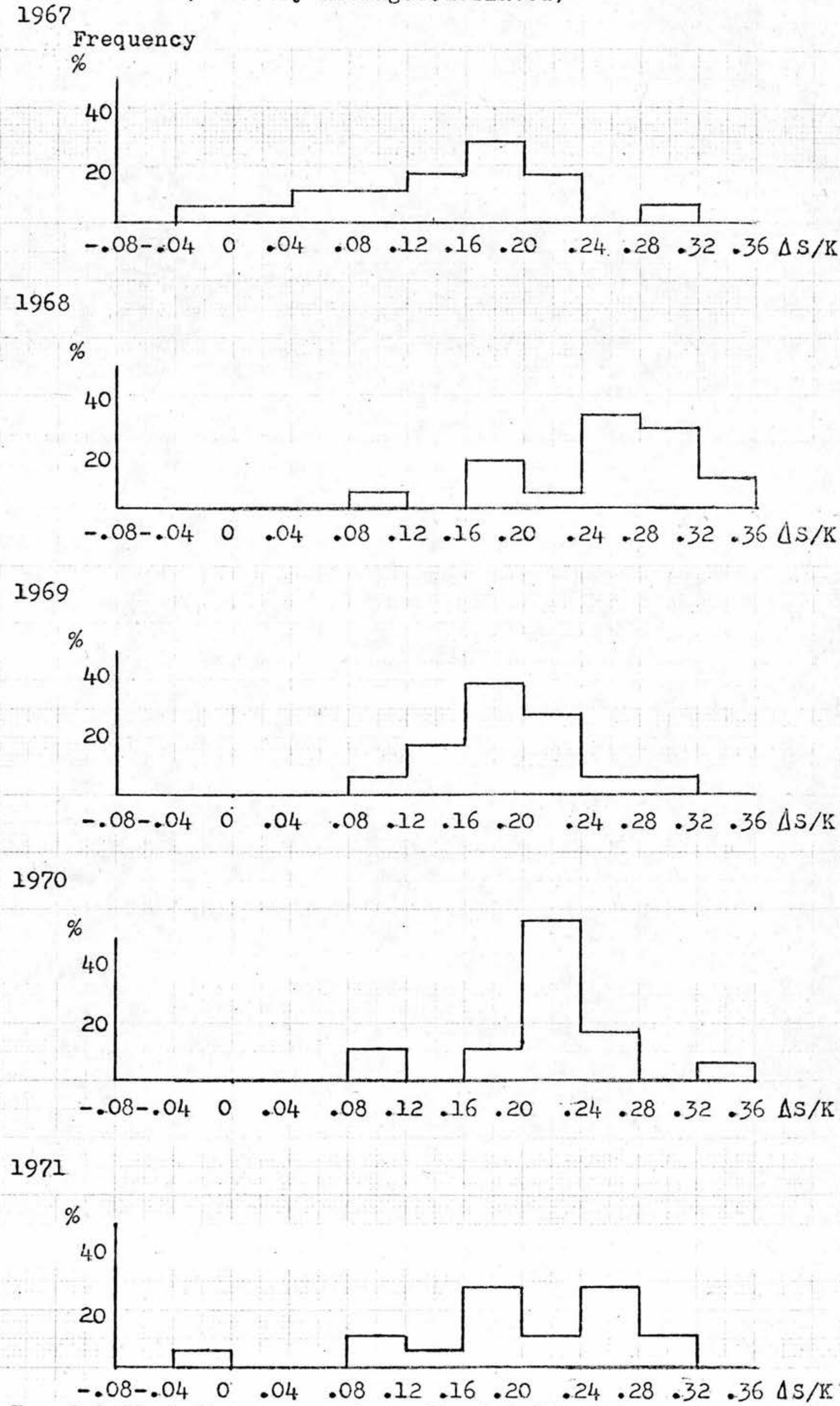
For detailed figures, see Appendix G, Table G.B.

FIGURE 3.C. Frequency Distributions of Sales (industry averages: deflated)



For detailed figures, see Appendix G, Table G.C.

FIGURE 3.D. Frequency Distributions of Change in Sales
(industry averages: deflated)



For detailed figures, see Appendix G, Table G.D.

Figure 3.E reports the pattern between years for the first variable on the finance side, disposable retentions. The progress of this variable has, of course, already been traced for the aggregates in Figure 2.A above: it suffered a progressive decline from 1967 to 1970, with a very mild recovery in 1971 to roughly the level of 1968. By contrast, the second source of internal finance, depreciation, exhibited great stability over the period (see Figure 3.F), as was suggested by Figure 2.A above.

The picture for the final explanatory variable, the opening liquidity stock, is presented in Figure 3.G. It was already negative at the beginning of this period: the decline in liquidity, from around 20% of net assets in 1948 was a notable feature of the post-war period, and amounted to around 10% of total sources of funds for the typical continuing quoted company.(21) In four of the five years considered here, the decline continued: the opening balance for 1968 showed an increase over 1967, but the subsequent years' levels fell progressively, echoing the decline in disposable retentions in each preceding year.

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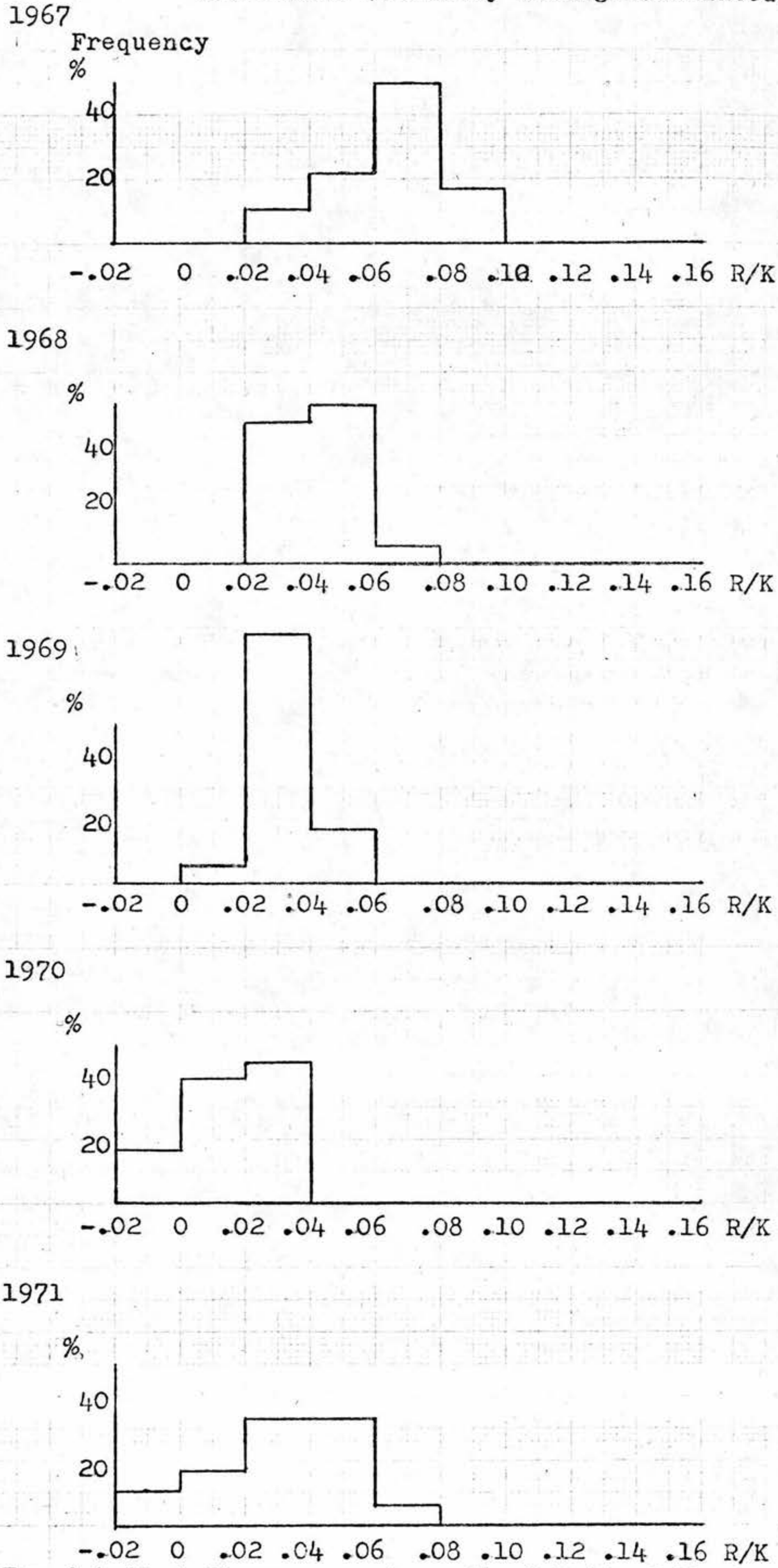
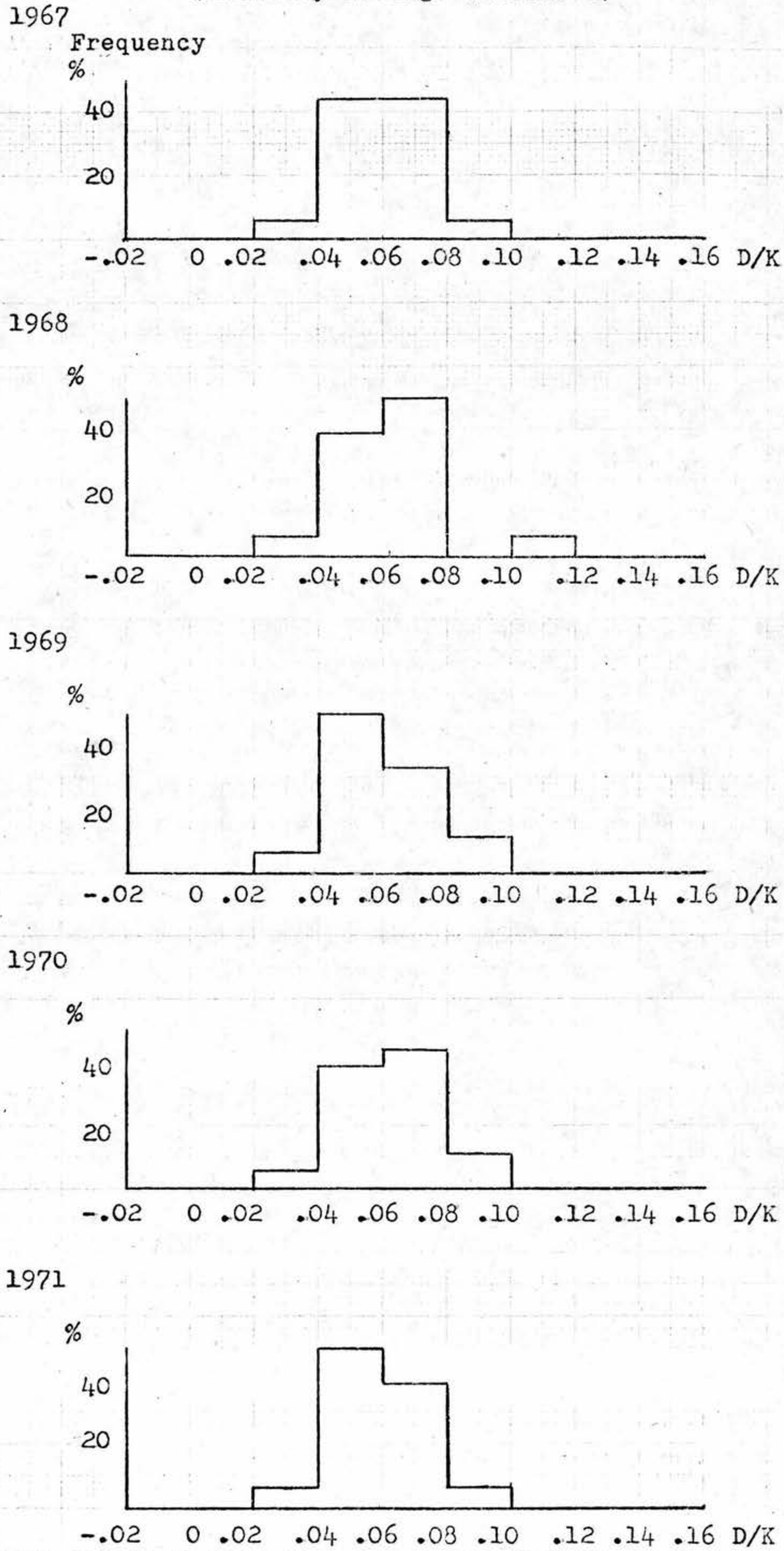
(21) See Meeks and Whittington (1975), Tables 2 and 4.

FIGURE 3.E. Frequency Distributions of Disposable Retentions (industry averages: deflated)



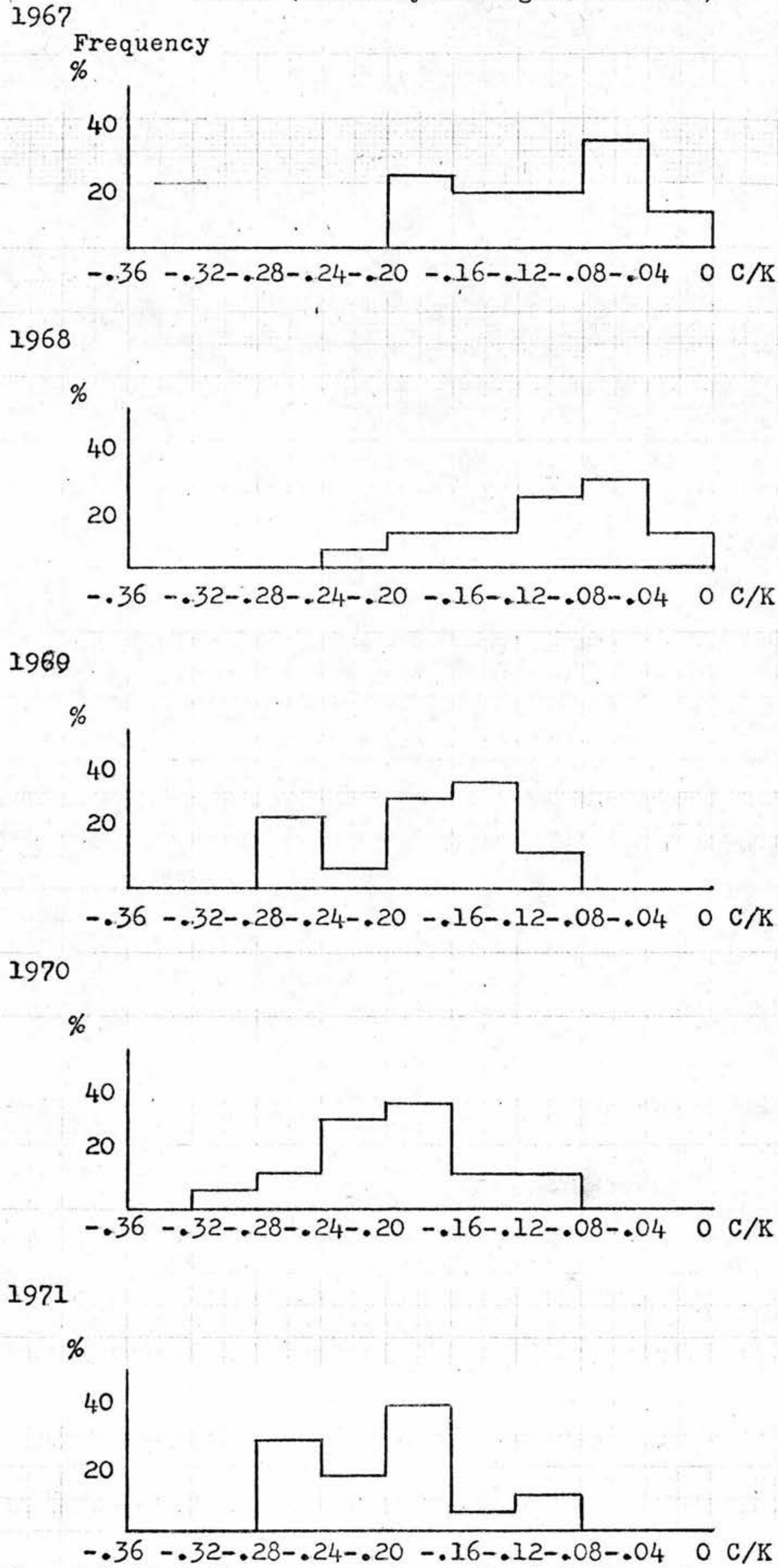
For detailed figures, see Appendix G, Table G.E.

Figure 3.F. Frequency Distributions of Depreciation
(industry averages: deflated)



For detailed figures, see Appendix G, Table G.F.

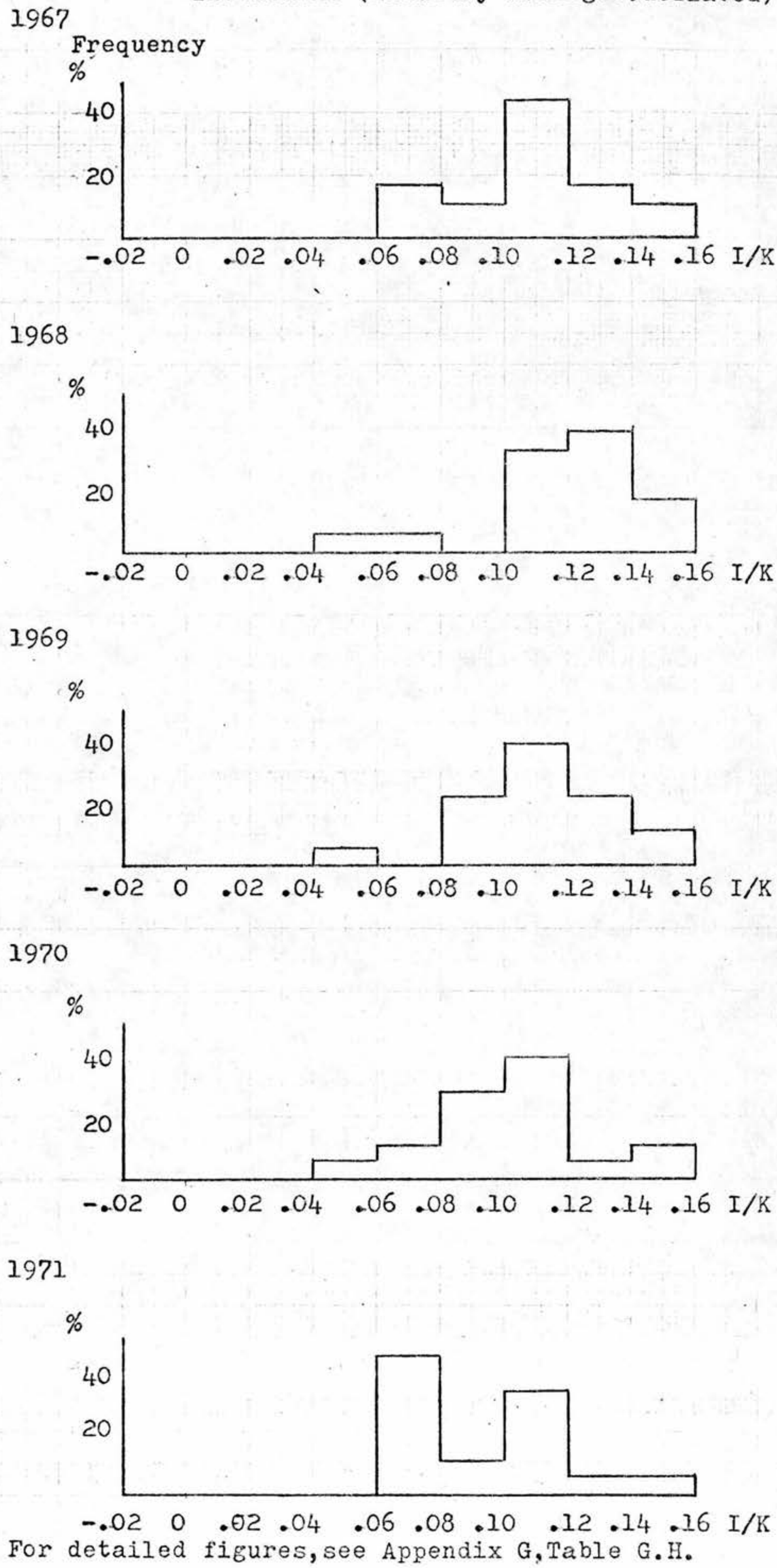
FIGURE 3.G. Frequency Distributions of Net Liquidity Stock (industry averages: deflated)



For detailed figures, see Appendix G, Table G.G.

Finally, Figure 3.H depicts the pattern of investment. 1968 was again the peak year, as it was for capacity utilisation and sales increase; and like disposable retentions and liquidity stocks, it subsequently showed a downward trend. Such associations would augur well for the model's performance in time series, for which, of course, the run of data is inadequate: the next chapter considers its performance in cross-section.

FIGURE 3.H. Frequency Distributions of Gross Investment (industry averages: deflated)



For detailed figures, see Appendix G, Table G.H.

Chapter 4

Savings and Investment 2: Multiple Regression Results

(a) Introduction

Appendix G reports the estimates of model 3(ii) for each industry-year. Since the model incorporates seven explanatory variables and is estimated for 90 separate sets of data, the results are somewhat hard to digest when presented in that conventional form. Accordingly, in this chapter attention is focussed on one explanatory variable at a time in order to assess the importance of the internal finance variables emphasised in Chapter 2 compared with the factors on the incentive side which were embodied in the model in Chapter 3.

Not only do the Tables included in this chapter report the size of the estimated coefficient, but also an indicator of whether the coefficient was significantly different from zero at the 5% level on a conventional statistical test. The inclusion of such tests does not, however, mean that a positive and statistically significant coefficient is used to support inferences about the universe of all companies for all time, for the results relate to a narrowly specified population: larger British quoted companies in the particular circumstances of the late sixties and early seventies. Their objectives and their access to external finance may well differ from those of smaller British companies or of companies in foreign countries with less well developed capital markets. Nor can their experience in these years readily be taken as a random sample from the very large number of years experience of this defined set of companies. For Chapter 2 has argued that variables which might be expected to influence investment took on values outside the range of earlier experience as unprecedentedly high rates of inflation were associated with unprecedentedly low levels of disposable retentions. In addition, conditions were unusual in other respects: the period was punctuated by a major devaluation, and towards its end witnessed the most severe depression since the war.

Thus it is preferable to see the results as descriptions of average relationships for industry-years in this period, rather than as tests of long-run theories with universal applicability. And the associated statistical tests can be interpreted as a useful way of summarising the mass of results, with the 5% significance test a conventional but arbitrary cut-off point distinguishing 'higher' and 'lower' degress of association between a particular independent and the dependent variable.[1]

(b) Regression results[2]

As Table 4.A shows, depreciation, the 'purest' of the two internal finance variables, was accorded a very powerful role by the regressions. The regression coefficient relating investment to depreciation was positive in 84 of the 90 industry-years included; and the coefficient was significantly greater than zero at the 5% level, according to the conventional statistical test, in 61 of the industry-years. A strong positive relationship seemed to operate for every industry and every year: in no industry did fewer than two of the five

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1. See section 7.C below for a parallel discussion for the merger study.
2. Note that any company without sales data for the current or previous year is excluded from the regression estimates for that year: see Chapter 3. Thus only around a half of the full population contribute to the results for 1967, and a small minority is excluded for 1968.

Table 4A

Partial Regression Coefficients: Investment on Depreciation

INDUSTRY	Year	1967	1968	1969	1970	1971
21	Food	4.203*	2.513*	0.820	0.733	-1.738
23	Drink	3.909*	0.924	0.653	2.055*	4.375*
26	Chemicals	1.002*	2.272*	2.923*	0.617	1.789*
31	Metal Manufacture	2.575*	0.501	1.701*	1.205*	1.164
33	Non-elect. Eng.	1.857*	2.575*	0.309	1.044*	1.368*
36	Electrical Eng.	0.976*	1.851*	0.328	0.864*	0.896 *
38	Vehicles	1.557	-0.181	3.370*	1.182	2.892*
39	Metal Goods, n.e.s.	3.839*	1.937*	2.395*	0.123	2.739*
41	Textiles	-0.348	1.865*	2.745*	0.993*	1.061*
44	Clothing & Footwear	2.268	2.418*	0.768*	1.690	1.526*
46	Bricks, etc.	- 0.379	1.609*	2.159*	1.620*	0.585
47	Timber, etc.	1.631*	2.395*	2.274*	2.941*	1.879
48	Paper, Printing, etc.	-0.497	1.178	0.998*	1.924*	-0.117
49	Other Manufacturing	0.299	-0.010	2.908*	1.471	1.639*
50	Construction	0.627	1.273*	1.642*	1.087*	1.253*
81	Wholesale Distn.	2.260*	2.013*	1.538*	2.213*	1.449*
82	Retail Distn.	2.950*	2.303*	1.229*	0.355	0.279
88	Miscellaneous Servs.	1.333*	1.787*	1.505*	1.349*	1.697*

* significantly different from zero at the 5% level.

For estimates of the full model for each industry-year, see Appendix G.

years reveal coefficients significantly greater than zero; and at least 11 of the 18 industries in any year produced coefficients passing this test. In the years identified in Chapter 2 as representing the most severe of the savings squeeze, 1969 and 1970, every single industry revealed a positive coefficient.[3]

The second liquidity flow variable, disposable retentions, also performed well in the regression analysis, as is shown in Table 4.B. The coefficient relating investment to this variable was positive in 78 of the 90 industry-years; and is significantly greater than zero in 39 of these cases.[4] Moreover, there was a tendency for the role of disposable retentions to be more powerful in years when its typical level was low: in 1970 when the savings squeeze was most severe (see Figures 2.A and 3E above), all 18 industries displayed a positive relationship between the two variables, and in ten the coefficient was significantly greater than zero on the criterion used here. By contrast, in 1967, the year with the highest retention level of those reported here, the number of positive coefficients (and of ones significantly greater than zero) was at its lowest. An analogous result holds for inter-industry comparisons. The four industries whose investment displayed the greatest sensitivity to their disposable retentions (according to the rule of thumb adopted here: most coefficients significantly greater than zero) were all identified in Chapter 2 (Figure 2.B) as suffering more severely than average

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3. See the discussion below (4.d) of why a strong association would be expected when the average level of the independent variable is low.

4. Since considerable error may have been introduced by the use of a general index when estimating this variable (see Chapter 3), its explanatory power is all the more striking. Of course, the other variables involve no estimation at this stage, but are derived directly from the standardised accounts of companies.

Table 4.B

Partial Regression Coefficients : Investment on Disposable Retentions

INDUSTRY	YEAR	1967	1968	1969	1970	1971
21	Food	0.321	0.595*	0.807	0.689*	-0.044
23	Drink	-0.421	-0.196	0.234	0.128	0.140
26	Chemicals	0.576*	0.121	-0.219	0.657*	0.311*
31	Metal Manufacture	0.293	0.504*	0.211	0.175	0.267
33	Non-elect. Engineering	0.363*	0.365*	0.367*	0.211*	0.116
36	Electrical Engineering	0.009	0.246	0.323	0.281*	0.254*
38	Vehicles	1.438*	0.547	0.898*	0.387*	0.323*
39	Metal Goods, n.e.s.	-0.338	0.499*	0.493*	0.318*	0.409*
41	Textiles	0.790*	0.197	0.462*	0.351*	0.270*
44	Clothing and Footwear	3.575	0.177	0.306	0.180	0.139
46	Bricks, etc.	0.630*	0.828*	1.471*	0.213	0.333
47	Timber, etc.	-0.830*	1.402*	0.488*	0.344	0.284
48	Paper, Printing, etc.	-0.559*	0.193	0.614*	0.457*	0.354*
49	Other Manufacturing	0.498*	0.445	0.193	0.187	0.310
50	Construction	-0.095	0.597*	0.369*	0.302*	0.107
81	Wholesale Distribution	0.369	0.307	0.122	0.272*	0.376*
82	Retail Distribution	-0.047	-0.229	-0.181	0.141	0.461*
88	Miscellaneous Services	-0.155	1.119	0.126	0.299	0.223

* significantly different from zero at the 5% level.

for estimates of the full model for each industry-year, see Appendix G.

from the stock appreciation mechanism:[5] stock appreciation preempted a larger share of their profit than it did for the aggregate quoted company sector.[6]

While both the liquidity flow variables were positively and strongly associated with investment, as Chapters 2 and 3 suggested they would be, the performance of the liquidy stock variable ran counter to expectations. The coefficient was negative in practically half (44) of the 90 industry-years considered; and in only 6 of the 90 cases did a coefficient emerge which was significantly greater than zero at the 5% level (see Table 4.C). In other words there was little or no suggestion that firms with more liquidity at the beginning of the year undertook more investment during the year: a feature which is at first sight surprising in view of the squeeze on liquidity flows documented above and reflected in the importance of internal finance in the regression estimates. One possible explanation of this lack of relationship would adduce the tendency of firms undertaking above average investment to economise more severely on cash balances and/or to finance a greater part of their expenditure through bank credit[7] (the liquidity stock measure used here is of course bank balances etc. minus liabilities to banks). If above average investment persisted, then low liquidity this year might be the result of high investment last year and yet

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5. These results are consistent with the suggestion made below (4.d) that a strong and positive relation between saving and investment will be detected for years or industries where internal finance is in short supply and is the operative constraint on investment.

6. The four industries were non-electrical engineering, vehicles, metal goods (n.e.s.) and textiles.

7. See the sources and uses of funds analysed by rate of growth by gross investment in fixed assets: Appendix J.

Table 4.C

Partial Regression Coefficients: Investment on Liquidity Stock

INDUSTRY / YEAR		1967	1968	1969	1970	1971
21	Food	-0.002	-0.013	0.128	0.164*	-0.016
23	Drink	0.028	-0.035	0.016	0.064*	0.041
26	Chemicals	0.124	0.105	-0.010	-0.050	-0.082
31	Metal Manufacture	-0.038	0.011	0.036	0.189*	0.084
33	Non-elect. Engineering	0.028	-0.037	-0.007	0.015	0.053
36	Electrical Engineering	-0.049	-0.095	0.012	-0.077	-0.119
38	Vehicles	-0.081	-0.002	0.082	0.052	-0.077
39	Metal Goods, n.e.s.	0.027	-0.006	0.071	-0.043	0.076
41	Textiles	-0.191	0.060	0.036	0.048	-0.040
44	Clothing and footwear	-0.844	0.139*	-0.095	0.151	0.003
46	Bricks, etc.	0.100	0.142	-0.007	-0.198*	-0.056
47	Timber, etc.	0.124*	-0.185	-0.101	-0.010	0.177
48	Paper, Printing, etc.	0.177*	0.106	-0.069	0.009	-0.021
49	Other Manufacturing	- 0.043	-0.119	0.006	0.034	0.083
50	Construction	0.143	-0.130	0.074	-0.036	-0.058
81	Wholesale Distribution	-0.039	-0.021	-0.047	-0.031	0.004
82	Retail Distribution	0.018	0.015	-0.049	0.034	-0.053
88	Miscellaneous Services	0.074	-0.213	0.044	0.022	0.116

* significantly different from zero at the 5% level.

for estimates of the full model for each industry-year, see Appendix G.

be associated with above average investment this year. This tendency would result in a negative association between liquidity stocks and investment - possibly sufficient to offset any positive relationship which existed on account of liquidity's permissive role in the investment decision, and to produce little or no association overall.

Tables 4.D to 4.F report the coefficients relating investment to the three variables apart from the age indicator which reflect incentives to invest: increases in sales, capacity utilisation and the level of sales. As expected, all were, by and large, positively related with investment, but, in comparison with the liquidity flow variables, they performed rather weakly. The influence of the increase in sales (reported in Table 4.D) appeared to be the most powerful: positive coefficients emerged in 63 of the 90 industry-years, and were significantly greater than zero in 20. For each of the other two variables, roughly two-thirds of the coefficients were positive too, but only 10 or 11 passed the test of statistical significance. It certainly could not be concluded from these results that investment was not positively related to these variables; but nevertheless, individually they hardly match the liquidity flow variables in explanatory power, and on these results primacy would be accorded to the two measures of internal finance.(8)

The final variable included in the regression model was a proxy for the average age of the firm's capital stock. It seemed possible that the processes of decay and obsolescence would stir companies whose capital stock was relatively old to invest more heavily in replacement equipment. In fact, as

8. But see section 4.d on that joint effect.

Table 4.D

Partial Regression Coefficients: Investment on Change in Sales

INDUSTRY / YEAR		1967	1968	1969	1970	1971
21	Food	-0.044	0.122*	0.089	0.132*	0.148
23	Drink	-0.024	0.205	0.069	-0.021	-0.039
26	Chemicals	-0.123	0.081	-0.064	-0.050	0.093
31	Metal Manufacture	-0.058	-0.020	0.191*	0.049	0.002
33	Non-elect. Engineering	0.012	-0.018	0.103*	-0.048	0.055
36	Electrical Engineering	0.094	0.085	-0.032	-0.085	0.087
38	Vehicles	0.004	0.286	0.230*	0.011	-0.111
39	Metal Goods, n.e.s.	0.206*	0.014	0.097*	0.198*	-0.035
41	Textiles	0.022	-0.021	-0.072	0.036	0.028
44	Clothing and Footwear	-1.540	-0.007	0.102	0.126	0.013
46	Bricks, etc.	0.134*	-0.040	-0.092	0.164	0.127
47	Timber, etc.	-0.057	0.198	0.021	0.076	0.246*
48	Paper, Printing, etc.	0.283*	0.064	0.236*	0.106	0.176*
49	Other Manufacturing	0.032	0.187*	0.192*	0.062	-0.036
50	Construction	0.149	0.090	-0.035	-0.003	0.143*
81	Wholesale Distribution	0.063	0.102	0.035	0.043	0.022
82	Retail Distribution	-0.014	0.172*	0.140*	0.140*	0.177*
88	Miscellaneous Services	0.088	0.023	0.145	0.067	-0.055

* significantly different from zero at the 5% level.

for estimates of the full model for each industry-year, see Appendix G.

Table 4.E

Partial Regression Coefficients: Investment on Capacity Utilisation

INDUSTRY / YEAR		1967	1968	1969	1970	1971
21	Food	0.098	0.188*	-0.014	-0.159	-0.118
23	Drink	0.097	-0.034	0.091	0.037	0.139*
26	Chemicals	0.282*	0.234*	0.173	0.151	0.008
31	Metal Manufacture	0.189	0.158	-0.034	0.053	-0.029
33	Non-elect. Engineering	0.002	0.117	-0.056	0.062	-0.008
36	Electrical Engineering	0.018	0.245*	0.040	0.141*	0.104
38	Vehicles	-0.286	-0.255	-0.197	0.063	-0.048
39	Metal Goods, n.e.s.	0.077	0.078	0.133*	0.049	-0.032
41	Textiles	0.038	-0.040	0.007	0.046	0.020
44	Clothing and Footwear	-0.521	0.220*	0.103	0.077	-0.085
46	Bricks, etc.	-0.081	0.004	-0.016	0.026	-0.046
47	Timber, etc.	0.090	-0.121	0.019	0.233	-0.211
48	Paper, Printing, etc.	0.057	0.036	0.002	0.159*	-0.093
49	Other Manufacturing	-0.121	0.186	0.006	0.136	0.067
50	Construction	0.265	0.158	0.030	0.112	-0.239*
81	Wholesale Distribution	-0.008	0.016	-0.027	0.132	-0.047
82	Retail Distribution	0.043	0.126	0.070	-0.074	-0.025
88	Miscellaneous Services	0.060	0.317*	0.056	0.047	0.037

* significantly different from zero at the 5% level.

for estimates of the full model for each industry-year, see Appendix G.

Table 4.F

Partial Regression Coefficients: Investment on Sales

INDUSTRY	YEAR	1967	1968	1969	1970	1971
21	Food	-0.007	-0.001	0.015	0.002	-0.005
23	Drink	-0.010	-0.009	0.005	0.013*	0.007
26	Chemicals	0.001	0.006	-0.011	0.014	-0.015
31	Metal Manufacture	-0.002	0.023*	0.001	0.020*	0.012
33	Non-elect. Engineering	0.003	0.007	-0.001	0.007	0.009
36	Electrical Engineering	-0.004	0.002	0.003	0.010*	-0.011
38	Vehicles	-0.002	-0.010	-0.002	0.014	0.009
39	Metal Goods, n.e.s.	0.014	0.017*	0.006	0.007	-0.001
41	Textiles	0.013	0.014*	0.005	0.009	-0.001
44	Clothing and Footwear	-0.006	-0.010	-0.001	0.011	0.005
46	Bricks, etc.	0.022*	0.014	0.000	0.001	-0.001
47	Timber, etc.	0.034*	-0.015	-0.003	0.008	-0.018
48	Paper, Printing, etc.	0.050*	-0.010	0.009	-0.016	-0.012
49	Other Manufacturing	0.011	-0.005	-0.016	0.021	0.023*
50	Construction	0.021	-0.019*	0.007	0.007	0.008
81	Wholesale Distribution	-0.001	-0.008	0.002	-0.004	0.004
82	Retail Distribution	0.014*	0.013	0.007	0.004	-0.009
88	Miscellaneous Services	0.003	0.002	-0.005	-0.006	-0.004

* significantly different from zero at the 5% level.

for estimates of the full model for each industry-year, see Appendix G.

Table 4.G shows, the relationship between gross investment and the age proxy was more often than not negative (in fifteen industry-years was the coefficient significantly less than zero at the 5% level; and in only two cases significantly greater). If the proxy is to be trusted, the results suggest that companies with younger equipment typically invested more heavily.[9]

One further feature of the regression results is reported in Table 4.H and relates to the main issue. This Table details the coefficient of determination for the regression for each industry for the first year of the period with substantially complete data, 1968, and for the last, 1971. In a majority of cases (11 of 18) R^2 is lower in the later year; and the declines are often appreciable whereas the actual increases are frequently relatively slight. Moreover, though not shown, the decline seemed to be progressive from year to year: in 1969, 1970 and 1971 the number of industries reporting declines in R^2 compared with the previous year was always more than half of the total. One possible explanation of this feature is that uncertainties were increasing over the period with the acceleration of inflation and the development of the deepest recession since the war; and that consequently animal spirits were dampened and investment deferred even when, according to the traditional indicators, the time was ripe for expansion.

This commentary has concerned itself with the statistical significance of the explanatory variables, saying nothing about their significance in economic

9. On the self-reinforcing effect of rapid growth by new investment see George (1971) p. 64; also Chapter 2 above on the high proportion of depreciation available for <u>net</u> investment to firms with faster rates of growth by new investment; and Chapter 9 below on the higher rates of profit enjoyed by firms with above average rates of growth by new investment.

Table 4.G

Partial Regression Coefficients: Investment on Age of Capital Stock

INDUSTRY / YEAR	1967	1968	1969	1970	1971
21 Food	-0.056	-0.117	0.157	-0.010	-0.084
23 Drink	-0.052*	-0.113	-0.075	-0.148*	-0.401*
26 Chemicals	0.013	-0.074	0.143	0.416*	-0.193
31 Metal Manufacture	-0.058	0.171	0.146	-0.189	-0.149
33 Non-elect. Engineering	-0.101	-0.080	0.000	-0.160*	0.140
36 Electrical Engineering	-0.088	-0.430*	-0.100	0.014	0.076
38 Vehicles	0.457	0.011	0.346	-0.066	-0.200
39 Metal Goods, n.e.s.	-0.161	-0.197*	0.023	0.109	0.035
41 Textiles	0.273	-0.359*	-0.082	-0.064	0.161
44 Clothing and Footwear	-0.657	0.029	0.095	0.051	-0.031
46 Bricks, etc.	-0.314*	-0.404*	-0.119	-0.027	-0.080
47 Timber, etc.	-0.394*	0.427	0.018	-0.460*	-0.265
48 Paper, Printing, etc.	0.018	-0.067	-0.071	-0.118	0.161
49 Other Manufacturing	0.136	0.009	0.043	-0.337	-0.194
50 Construction	0.279	0.107	-0.164	-0.343*	0.083
81 Wholesale Distribution	-0.299*	-0.235	0.038	0.134	0.201*
88 Miscellaneous Services	-0.195	-0.139	-0.357*	-0.109	-0.322*

* significantly different from zero at the 5% level.

for estimates of the full model for each industry-year, see Appendix G.

Table 4. H

The Coefficient of Determination (model 3.ii):
1968 and 1971

INDUSTRY	YEAR	1968	1971
21	Food	0.817	0.408
23	Drink	0.490	0.565
26	Chemicals	0.594	0.308
31	Metal Manufacture	0.565	0.263
33	Non-elect. Engineering	0.473	0.255
36	Electrical Engineering	0.616	0.368
38	Vehicles	0.418	0.437
39	Metal Goods, n.e.s.	0.659	0.484
41	Textiles	0.606	0.421
44	Clothing and Footwear	0.739	0.555
46	Bricks, etc.	0.778	0.491
47	Timber, etc.	0.775	0.575
48	Paper, Printing, etc.	0.269	0.394
49	Other Manufacturing	0.577	0.500
50	Construction	0.442	0.548
81	Wholesale Distribution	0.270	0.547
82	Retail Distribution	0.404	0.437
88	Miscellaneous Services	0.426	0.435

For estimates of the full model for each industry-year, see Appendix G.

terms. There are two reasons for this. Firstly, all the coefficients vary a good deal between industries and years, so that it is hard to summarise typical experience. The second point is related: section 4.d below argues that the specification of the relationships in this model may be inadequate: an alternative interpretation of the results brings the estimated regression coefficients into question, and suggests reasons for the diversity of the coefficients - especially between years for the same industry.

However, if, for the sake of argument, this version of the model is accepted, what can be said of the economic significance of the coefficients? The coefficients on the finance side are easy to interpret: a value of 1.0 means that a difference of £1 in the respective component of finance is typically associated with a difference of £1 in investment. The depreciation coefficient is often above 1 : perhaps firms with above average internal finance this year are more confident of above average income in future years and consequently not only commit all their current depreciation provisions to investment but also raise and invest above average external finance this year? The retentions coefficient is generally lower: perhaps firms are more ready to commit their prospective depreciation provisions to investment for the current year since these provisions will be forthcoming provided only that the firm does not make a loss, while greater doubt might attach to successively higher slices of retentions at the time when the current year's investment is ordered: poor profit or high stock appreciation in the rest of the year might put them at risk.

The coefficients on the incentive side can be interpreted less directly: on the assumptions made above, say, an extra pound of sales is likely to elicit different quantities of investment in industries with different capital-output ratios. Respective changes in the explanatory and dependent variables are perhaps best related to their own intra-industry variation. Thus, to take one or two specimen coefficients which have passed the statistical test of significance, for the food industry in 1970, a difference of one standard deviation in the change in sales was associated with a difference in investment equal to 28% of the dependent variable's standard deviation. For electrical engineering in 1970, the equivalent difference in the independent variable (one standard deviation) was associated with a difference of 30% of the standard deviation of investment when capacity utilisation was the explanatory variable, and 27% when the exercise was repeated for the sales level instead. Of course these specimens are not necessarily representative: but they do suggest that the influence of these variables need not have been trifling.

(c) <u>Comparisons with the results of earlier work</u>

There are many respects in which the analysis of this and the previous chapter has been modelled on the work of Meyer and Kuh; and, although their results related to another country (the U.S.) and a different period (the late forties), they are often similar to those reported here. They accord in particular in finding a relatively weak association between investment and liquidity stocks (albeit differently defined) and an often negative association between investment and the indicator of the capital stock's age. However, the most significant similarity for the special issue at stake here - the role of the savings squeeze in restraining investment - was their general opinion that the "conclusions ... converge in their emphasis upon the importance of internal liquidity/flows/" (p. 190). Moreover, they reached such conclusions on the basis of less unanimous results than those presented here. Firstly, the partial correlation coefficient between investment and depreciation was statistically significantly greater than zero at the 5% level in 12 of 72 industry-years in their study, whereas the parallel result in this analysis held for 61 of 90 industry-years[10]. Secondly, their partial correlation between investment and profits, which, in years of low inflation and stock appreciation and of consequent close association between profits and retentions, corresponds reasonably with the disposable retentions result provided here, passed the same test in 17 of 75 industry-years compared with 39 out of 90 here. It is very possible that U.K. experience in the late forties was not greatly dissimilar from that for the U.S. at the time but that the stagnation of disposable savings and declines in liquidity balances in the U.K. in recent years have boosted the influence of current internal liquidity flows. Be that as it may, if their results supported such emphasis upon the role of internal finance, those presented here warrant conclusions in the same mould and at least as confident.

Similar cross-section work for the U.K. has of course been inhibited until recently by the lack of the crucial sales data. Nevertheless, two such studies have appeared using U.K. data for the fifties and sixties. One, by Dimsdale and Glyn (1971) used a small sample (generally below 50) which

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10. They relied upon multiple correlation analysis for the most part. But of course, with the same model and data the test for a partial correlation coefficient significantly greater than zero is equivalent to that for a partial regression coefficient significantly greater than zero. The number of independent variables in their model was the same; and their definition broadly comparable.

was not stratified by industry and of course included only those companies which voluntarily disclosed their sales level (and which probably tended to be the larger, more successful ones - which probably enjoyed easier access to external finance: see Meeks and Whittington (1975)). Moreover, their estimation was to some extent bedevilled by their inclusion of two highly correlated explanatory variables on the finance side, profits and an internal finance measure incorporating retained profits. They did, however, find (consistent with the results in this chapter) that investment was more often positively and significantly (in the statistical sense) related to internal finance towards the end of their period (1968) - which was the time when the savings squeeze was beginning to take effect, it has been argued above.

The second British study (Jack (1968)) is of relatively little help in distinguishing the influence of internal finance upon investment. Having derived a model using sales as the chief exploratory variable, Jack substituted profit for sales at the last moment before estimating the model - on the grounds that the two are positively related and sales data were not available. Thus, according to the assumptions adopted here, profit becomes a hybrid variable representing the influence of both capacity utilisation and internal finance.

(d) The results in perspective

The results given in section 4.b are then favourable to the suggestion that investment has been sensitive to the flow of internal finance in recent years and support an affirmative answer to the question whether the savings squeeze is likely to have restrained investment. It would be desirable to explore this issue further, however, and to ask whether an increase in internal finance would elicit the sort of increase in investment represented in the regression coefficient. In addition, although the factors on the incentive side in the model were introduced primarily in order to hold other things equal when assessing the impact of the ability to finance investment internally, and although it is not a main aim of this analysis to discriminate between alternative theories of investment, it would clearly be relevant to the main issue to know whether a reduction in the variables on the incentive side would often leave investment unaffected - a conclusion which might be drawn on a strict interpretation of the finding that regression coefficients relating investment to incentives were often not significantly greater than zero on the standard statistical tests.

To take first the second issue, of whether incentives matter, Table 4.I presents an interesting complement to the results for individual coefficients reported in section 4.b. It sums for two sets of independent variables the improvement in R^2 attributed to the addition of the individual variables to the regression equation. The two sets of variables are on the one hand the four which were classified as incentives (sales, sales increase, capacity utilisation and age) and on the other the three finance variables (depreciation, disposable retentions and liquidity stock). The comparison is made for 1970, a year which was notable for the 'success' of the individual finance variables but not of the incentive variables. As the Table shows, however, the comparison presented here is much more favourable to the collective success of the incentive variables: in 9 of the eighteen industry-years they boast the larger increase in R^2, and in one there is a tie. On this criterion, therefore, one would hardly be justified in disregarding the influence of the incentive

Table 4.I

The increase in R^2 attributed to the incentive and the finance variables collectively: 1970

INDUSTRY		Incentive	Finance
21	Food	0.436	0.424
23	Drink	0.268	0.265
26	Chemicals	0.248	0.249
31	Metal Manufacture	0.497	0.093
33	Non-elect. Engineering	0.117	0.117
36	Electrical Engineering	0.115	0.340
38	Vehicles	0.213	0.196
39	Metal Goods, n.e.s.	0.345	0.136
41	Textiles	0.175	0.179
44	Clothing and Footwear	0.363	0.054
46	Bricks, etc.	0.243	0.276
47	Timber, etc.	0.433	0.162
48	Paper, Printing, etc.	0.162	0.330
49	Other Manufacturing	0.459	0.086
50	Construction	0.176	0.215
81	Wholesale Distribution	0.124	0.272
82	Retail Distribution	0.346	0.029
83	Miscellaneous Services	0.124	0.370

For estimates of the full model for each industry-year, see Appendix G.

variables.

An explanation of this comparison is available. It can be argued that three of the incentive variables (sales, change in sales and capacity utilisation) are vying to represent broadly the same stimulus to invest. A company with buoyant demand is likely to record values above the industry average for all three variables. Some independent influence still attaches to each, so that their intercorrelation is not such as to pose severe problems of multicollinearity; but nevertheless positive correlations between them are the rule.[(11)] Thus simple correlations between any of these incentive variables and investment perform relatively well - as is shown in Figure 4A; while they steal one another's thunder when incorporated in the same regression equation.

Following a paper by Gay Meeks (1974), a further objection might be raised to any temptation to dismiss the influence of the incentive to invest; and this also bears on the related issue of interpreting the respective regression coefficients as estimates of the impact on investment of changes in the individual explanatory variables. It is common in interpreting regression coefficients to presume that each of the factors on the explanatory side represents a sufficient condition for a change in the dependent variable, but that neither is a necessary condition. Thus in the simplified model 4(i) to 4(v), a unit increase in W is presumed to elicit a unit increase in I if F remains unchanged; and the same holds for a unit increase in F with W unchanged:

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11 This is borne out by the actual intercorrelations (not reported here).

FIGURE 4.A. Frequency Distributions of Industry Correlation Coefficients:1970

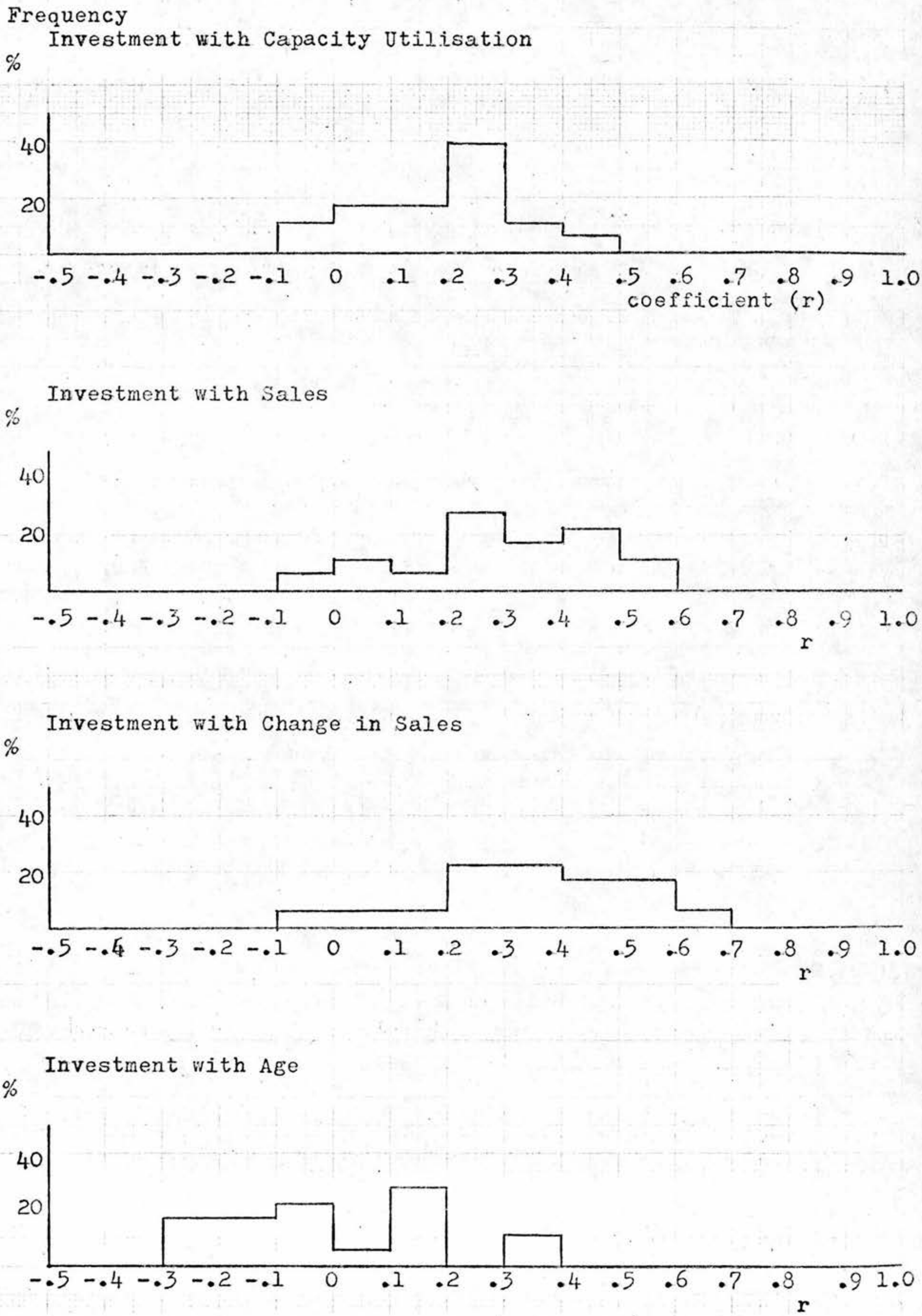
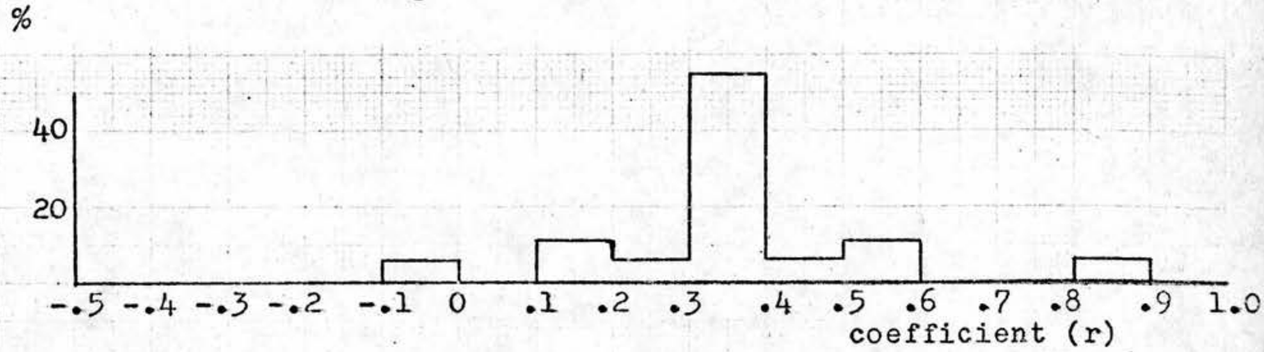


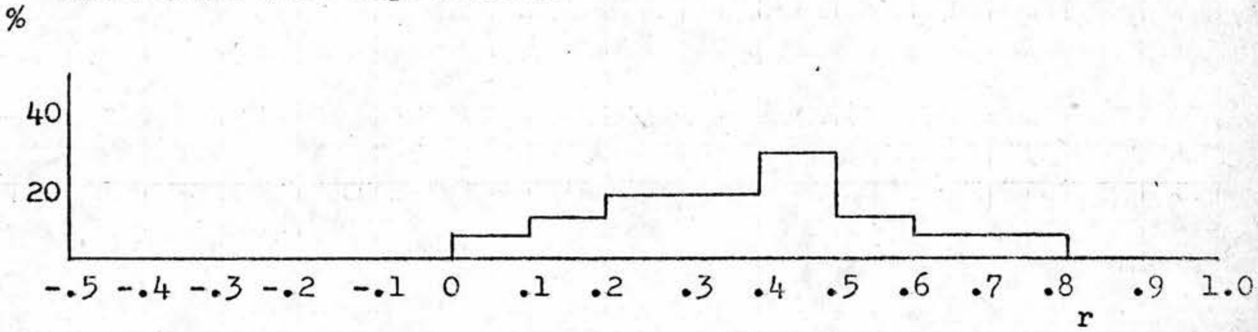
FIGURE 4.A.(cont.) Frequency Distributions of Industry Correlation Coefficients:1970

Frequency

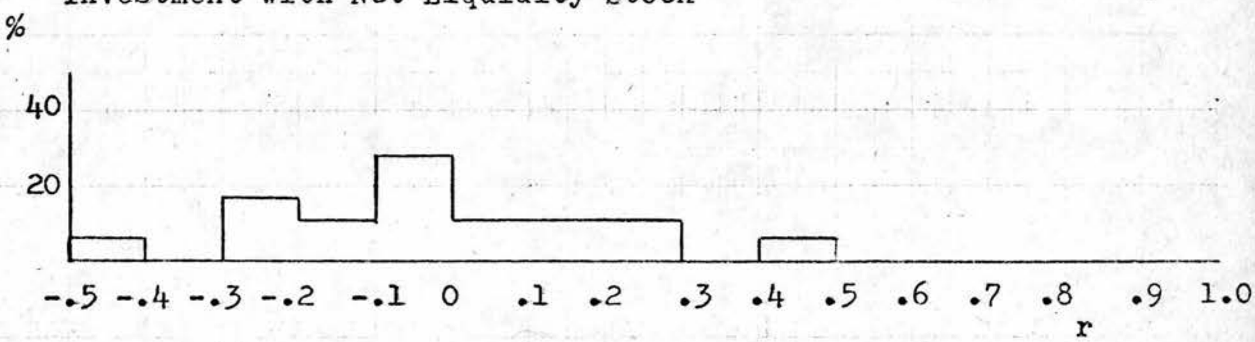
Investment with Disposable Retentions



Investment with Depreciation



Investment with Net Liquidity Stock



See Appendix G,Tables G.J. to G.P. for coefficients for each industry for all 5 years.

$$I = b_1 W + b_2 F \qquad 4\ (i)$$

Assume for simplicity that:

$$b_1 = 1\ ; \quad b_2 = 1 \qquad 4\ (ii)$$

Then, $\Delta I = \Delta W + \Delta F$ 4 (iii)

$$\Delta I = \Delta W \text{ where } \Delta F = 0 \qquad 4\ (iv)$$

$$\Delta I = \Delta F \text{ where } \Delta W = 0 \qquad 4\ (v)$$

where: I = actual investment undertaken

W = variable representing the incentive to invest

F = variable representing the ability (i.e. finance) to invest.

In the case of investment, however, it seems reasonable to question this presumption. Faced with an increase in the demand for his product but insufficient capacity to meet it, the manager may expand provided that he can raise adequate finance. Finance is then a necessary condition for investment (after all, 'the necessary' is a standard slang expression for finance). Moreover, the argument may be extended. Faced with a sizeable inflow of internal finance the manager may spend it on new capacity provided that the incentive to invest exists (e.g. that he can expect to sell profitably the output from that capacity): the incentive too might be a necessary condition for investment.(12) Together, but not alone, the two factors might well represent the necessary and sufficient condition for investment to take place. This situation can be represented using the sumbols provided above in a second

12. In that the right number of units of the incentive would be necessary for a given level of investment, not just that the presence of some quality called incentive was required. The more usual interpretation of a necessary condition might be the latter.

model, 4(vi) to 4(xi):

Assuming again, for simplicity, a one to one relationship between either F or W and I:

$$I = W \quad \text{iff} \quad F \geq W \qquad 4(\text{vi})^{(13)}$$

$$I = F \quad \text{iff} \quad W \geq F \qquad 4(\text{vii})$$

(W = value of investment justified by incentives; F = value of investment permitted by finance).

Then, considering changes in investment, if the process starts with W and F equal, then the condition for an increase in W to be associated with an equal increase in I is that F must also rise by at least as much as W:

When $W = F$,

$$\Delta I = \Delta W \quad \text{iff} \quad \Delta F \geq \Delta W \qquad 4(\text{viii})$$

and similarly,

$$\Delta I = \Delta F \quad \text{iff} \quad \Delta W \geq \Delta F \qquad 4(\text{ix})$$

If F already exceeds W then the condition becomes more complicated.

$$\Delta I = \Delta W \quad \text{iff} \quad \Delta F + (F-W) \geq \Delta W \qquad 4(\text{x})$$

and, similarly, if W already exceeds F :

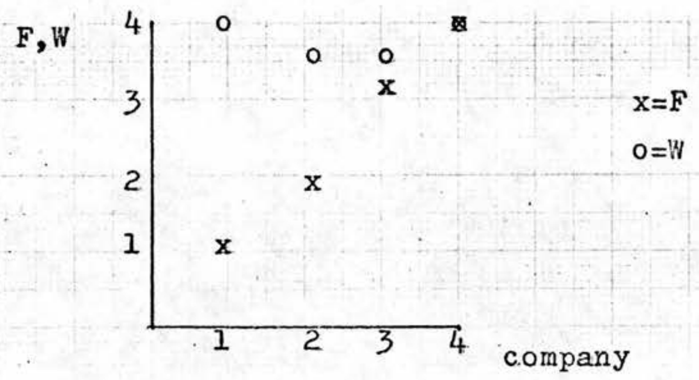
$$\Delta I = \Delta F \quad \text{iff} \quad \Delta W + (W-F) \geq \Delta F \qquad 4(\text{xi})$$

Figure 4.B attempts to illustrate how such a set of conditions might affect the interpretation of correlation and regression estimates. Section 1 of the diagram displays the values of F and W for four companies. F is represented by crosses and W by noughts. In each case $F \leq W$, and so in every case $I = F$. The subsequent two sections of the diagram

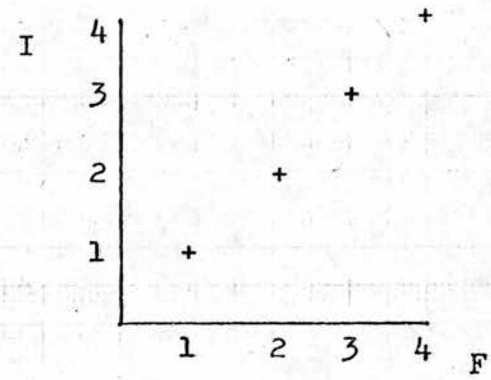
13. Where iff means if and only if.

FIGURE 4.B. The Relationship of I with F and W

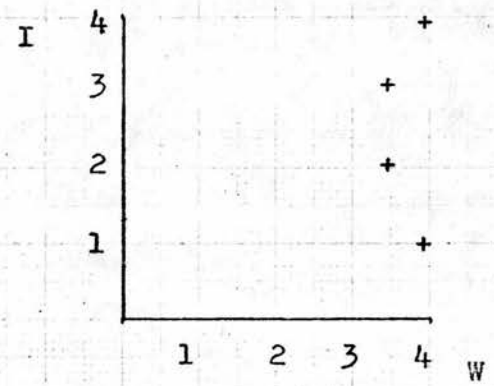
1. F and W for each company



2. Scatter of I against F



3. Scatter of I against W



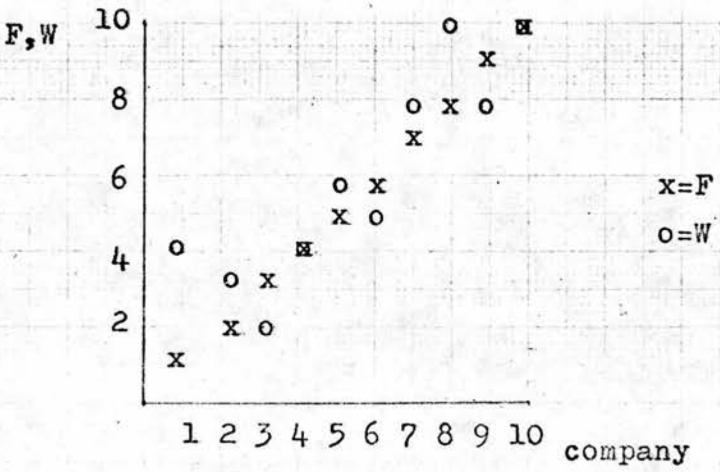
represent the scatter of I on F and I on W. The correlation of I and F naturally leads to a perfect result, and the regression of I on F would yield a regression coefficient of unity. Yet for company 4, an increase in F of one would on these assumptions lead to a zero increase in I if W were unchanged; for company 3 the same conditions would elicit an increase in I of 0.5; for companies 1 and 2 an increase of one in F would yield a unit increase in I if W were unchanged. But even for companies 1 and 2 an increase of 4 in F would not elicit a rise of 4 in I.

The coefficient of correlation or regression of I on W would however be zero (see section 3 of the diagram) - even though we know on the assumptions made above that the role of W in eliciting I is exactly parallel with that of F. All that the summaries of statistical association appear to reflect is which factor was the operative constraint on investment in the period of observation. In an alternative period where W was the operative constraint and was represented by the crosses in section 1 of the diagram (F by the noughts), exactly the same underlying causal link would have produced the reverse regression results.

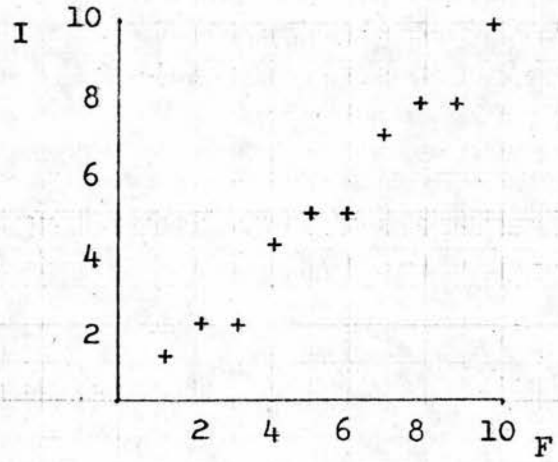
This example provides a warning against too rigid an interpretation of correlation and regression coefficients when the suggested causal link operates. But does this mean that all the results provided above would be invalid in such a regime? Perhaps the principal conclusion could yet be salvaged. The extreme case of Figure 4.B suggested that the stronger correlation was accorded to the variable which actually operated as the constraint in the observation period. Figure 4.C supports this conclusion

FIGURE 4.C. The Relationship of I with F and W

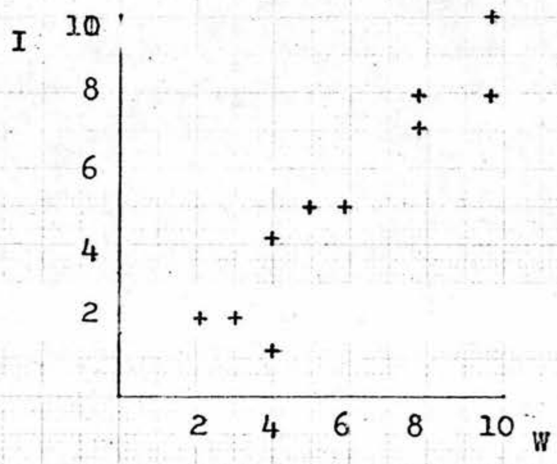
1. F and W for each company



2. Scatter of I against F



3. Scatter of I against W



with a less extreme example. This time 10 companies are considered. In 3 cases W is the constraint, in 2 cases F and W are equal, and in 5 cases F is the constraint. The scatters of I against F and W confirm a higher correlation between I and F than between I and W. It seems likely on this interpretation that the strong statistical association reported above between I and the internal finance variables, which was especially marked in years and industries where the average level of internal finance was relatively low, means that internal finance was for many companies the operative constraint.[14]

To summarise, this alternative interpretation of the causal link between the desire and the ability to invest and actual investment yields two firm conclusions and one tentative one.[15] Firstly, even a zero statistical relationship between investment and the incentive variables would not mean that the incentive was unimportant or could be reduced without curtailing investment. Secondly, the actual value of the positive regression coefficient relating investment to internal finance would not adequately represent the relation of an increase in investment to an increase in finance: not only would the incentive have to be in abundant supply for this to operate, but also, if the incentive sometimes intruded to restrain investment in the period of observation, the estimated relationship is likely to misrepresent the underlying

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14. This conclusion holds most clearly for simple correlations (such as are provided in Figure 4.A), and might be obscured by interrelationships with third variables in partial correlation or regression analysis.

15. Of course, if it is believed that the assumptions of the original model are justified (both factors unnecessary but sufficient) then the conclusions of section 4.b will be preferred.

relationship of investment with finance which would have obtained had the incentive never constrained investment.[16] The final, tentative result is that the relatively high correlation between internal finance and investment may reflect the fact that internal finance was often the operative constraint on investment in the period studied: thus an affirmative answer might still be given to the question whether the savings squeeze restrained investment; while quantification of its effect would be elusive.

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16. Hence the rather sceptical attitude in section 4.b to the interpretation of the regression estimates.

Chapter 5

Conclusions of Part 1

Have profits been squeezed? A measure of profit appropriate for all purposes is elusive, as appendices A and B suggest; and as Chapter 2 shows, conventionally measured profit belies companies' ability to invest from internal funds. It documents a widening gap between conventional and disposable profit in recent years, attributing it to two vehicles of inflation: stock appreciation and the increasing absorption of depreciation provisions by fixed asset replacement costs. It argues that if managements wish to maintain their companies' purchasing power, it is not enough that nominal earnings keep pace with the rise in prices as it is for wage and dividend recipients. In addition, increases in conventional profit have to match increases in stock appreciation; and since stocks are on average two or three times earnings, earnings must rise by a multiple of any increase in the inflation rate if disposable profits are to be maintained. In fact, earnings have failed to rise at this extravagant rate as inflation has accelerated; and so, in spite of an apparently satisfactory record in the late sixties in terms of traditional profit, the real saving of the quoted company sector declined from 1967 to 1970 and the recovery in real saving in the early seventies is much less vigorous than the movement of conventional profit might suggest.

Has the saving squeeze restrained investment? As Chapter 3 reports, a large body of theoretical literature has argued that companies will be reluctant to invest much more than they can finance from internal sources - especially when these companies are controlled by managers rather than owners. The more common supporting arguments are that external finance is more costly than internal when capital markets are imperfect; that the threat to the manager's security is acute if a large externally financed project fails whereas the gains to him from its success are limited when he has little or no equity interest; and that raising external finance often involves unwelcome outside scrutiny of the manager's plans and record, whereas provided that a middling record has been achieved and existing shareholders are passive, the investment of internal finance generally requires no external sanction.(1)

The average pattern of company financing is consistent with this view: if growth by takeover financed through share for share exchange is excepted a major proportion of the expansion of the typical company is financed from internal sources. Yet this average pattern might not contradict an alternative view: it could mask considerable diversity between companies in the proportion of expansion financed by internal funds. Investment might still be determined entirely by factors on the incentive side with companies indifferent to the proportion which they financed from internal sources. Further work to resolve this issue required a model relating investment to saving but at the same time allowing for incentive factors on the explanatory side. Such a model was developed in Chapter 3. The two sources of internal finance emphasised in Chapter 2, depreciation provisions and inflation - adjusted retentions, were included together with a liquidity stock measure as finance variables; while variables representing replacement needs, capacity utilisation and sales expectations were incorporated on the

1. The arguments against external finance raised by share for share exchange, etc. during takeover are less strong: see Chapters 9 and 10.

incentive side.

Chapter 4 reported estimates of this model using linear multiple regression. A standard interpretation of the estimated model, where each explanatory variable represents a sufficient but not necessary condition for investment to take place, accorded a major role to the two components of disposable savings, confirming prior expectations, and suggesting in answer to the principal question in this part of thesis that the savings squeeze is likely to have restrained investment. An alternative interpretation of the explanatory variables' relationship with investment described the incentive and the ability (finance) to invest as, together, the necessary and sufficient condition for investment to take place. This interpretation would undermine standard inferences from the actual associations observed between investment and the ability or incentive to invest; and, in particular, create problems for estimating the quantitative impact upon investment of, say, a £1 reduction in internal finance. It seemed likely, however, on the basis of a casual assessment, that the qualitative conclusion derived from the data on the standard interpretation would survive in this scheme. It was suggested that internal finance may well have been the chief operative constraint upon investment in this period, and especially in years or industries where the savings squeeze was making itself felt most severely.

The results of this part of the thesis are to some extent incomplete, lacking quantitative estimates of the impact of saving on investment if it is assumed that this alternative interpretation holds. An attempt to achieve such estimates is tempting, but would require a major extension of the work.[2] It was thought preferable to devote the rest of the thesis to the other major component of company growth, takeover, which has so far been neglected. For although this part of the analysis has to be qualified and produces incomplete results, yet several policy conclusions have emerged which further work would only succeed in making more exact.

Firstly, Chapter 2 shows that, say, an incomes policy which succeeded in reducing the rate of inflation would result in higher disposable saving for companies if aggregate conventional profit were quite unchanged: the share of stock appreciation in profit would be reduced, and the proportion of depreciation available for net investment would be higher than it would otherwise have been.[3] Conversely, continued acceleration of inflation with conventional profit unchanged would imply a decline in disposable saving.

Secondly, the conclusions of Chapter 2 and Appendices A and B suggest that a successful prices and incomes policy urgently requires a new basis for measuring profit in published accounts. The continuation of dividend restraint together with controls over prices and wages mean that the volume of internal funds available for investment is, broadly speaking, determined by government policy.[4] These funds are likely to exert a strong influence

2. Perhaps some technique might be found using prior information and dummy variables. Future work is planned on this topic.

3. This argument is of course independent of the fact that unchanged money income would buy a greater quantity of goods in future years if the rate of inflation were reduced.

4. This can be seen in terms of the simplified income account introduced in Chapter 2. The government determines gross income by controlling prices in relation to costs; it sets constraints on dividends and decrees the tax bill; stock appreciation is given by the rate of inflation and the stock level necessary to maintain the business. Disposable internal funds represent the residual.

over actual investment according to the argument of Chapters 3 and 4: so that investment levels become to a large extent part of the prices and incomes policy. If it is accepted that informed public discussion of different groups' income levels and of desired investment is a prerequisite of an effective incomes policy, then the need for relevant accounting data on companies' income is clear. Yet existing accounting information gives a very poor guide to the funds available within the firm for investment, taxation and distribution: on the argument of Chapter 2, high conventional profits composed largely of stock appreciation may leave a firm highly illiquid but leave the unions and the public sceptical of the managers' pleas for higher earnings in order to sustain investment.

On the arguments presented in earlier chapters, the government may still have an instrument for raising the aggregate investment achieved even if the level of aggregate savings is taken as fixed (as part of other policies). The company tax system of the Labour Government of the late sixties involved relatively high rates of taxation on dividends and low rates on retentions together with subsidies on investment; in consequence, it redistributed the (reduced) total of saving towards companies undertaking investment from those distributing a high proportion of income. There may be political and equity objections to such a system; and some would argue that it inhibits the recycling of funds through the capital market via dividends and new external finance, with consequent inefficiency in the allocation of financial resources. But be that as it may, if a certain level of internal finance is for the manager the sine qua non of a given level of investment and the current level of savings is an operative constraint on investment, then such a policy is likely to be successful in eliciting greater total investment from a given aggregate of saving.

PART 2

PROFITS AND GROWTH BY MERGER

Chapter 6. The Scale of Takeover Activity in Post-war Britain

a. Introduction

Part I has focussed on companies' expansion by new investment in fixed assets; Part II considers one of the other major means of growth, the purchase of new subsidiaries. Whereas, in the earlier part, attention was concentrated on the determinants of investment in the light of the savings squeeze, this part is initially concerned with the consequences of takeover for the internal efficiency of companies: the final two chapters return to the subject of financing growth, contrasting the means of financing takeover with the methods of financing new investment in fixed assets. This chapter forms a background to the work, documenting the scale of takeover activity in the post-war period.

b. The record in the post-war period

Table 6.A. provides an annual series of expenditure on new subsidiaries and trade investments by the 893 companies which continued in independent existence within the Department of Industry (D.I.) quoted company population for the period 1948-69.[1] In money terms the

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1. 1969 was chosen as the closing date because many companies were excluded from the D.I. population thereafter: in particular a new higher minimum size criterion was applied for the inclusion of a company in the population. This limits the number of companies surviving from 1948 until after 1969. Some changes in the definition of the D.I. population also took place prior to 1969 (see appendix F.), so that only by focussing on the experience of a continuing set of companies can changes in company behaviour be distinguished from changes in the membership of the population. Some data on the takeover record of all quoted companies for years prior to 1967 are provided in Rose and Newbould (1967). Data for years after 1969 are provided below (footnote 3).

level of this expenditure has risen steeply over the period; and the rise must have been considerable in real terms too, since inflation alone would have produced only a doubling within this period.[2] Indeed, as the rest of Table 6.A. shows, the growth of expenditure on takeovers has outpaced that on gross new investment in fixed assets: whereas in the early part of the period purchases of new subsidiaries represented only a very minor percentage of new investment, the later years saw this expenditure equal to around a half of new investment, and in one year, (1968) actually exceed it.[3]

One reservation attaches to the picture given here for the increase in these forms of expenditure: the purchases of new fixed assets and of subsidiaries by victims which were acquired after the beginning of the period are included in the continuing parent's expenditure in later years, but not in earlier ones. Thus rising expenditure by continuing companies could be consistent with stable expenditure by companies in aggregate: the continuing companies would simply be extending their share of total activity. However, while this qualification does affect comparisons between years of the level of either form of expenditure, it does not alter the comparison between the

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2. See Central Statistical Office (1972) Table 16. The upward trend is somewhat exaggerated, however, as the D.I. changed to a less conservative basis for valuing takeovers from 1964 (see appendix D).

3. Expenditure on acquisitions has not tended to decline since the end of the period studied. Indices for this expenditure (1964 = 100) for all industrial and commercial companies show the following picture:

1964	'65	'66	'67	'68	'69	'70	'71	'72	'73
100	102	99	163	385	185	195	158	439	226

(derived from Department of Industry (1974), Table 8).

two forms of growth in any particular period: purchases of subsidiaries were increasing at a considerably faster rate than purchases of new fixed assets.

This broad picture for the aggregates is confirmed by the results in Table 6.B., which analyses the growth of the typical quoted company into its various components, including growth by takeover. These components of growth are expressed as a percentage of opening net assets for each company-year and the results averaged across all company-years within each period, for two populations, those which continued in independent existence within the D.I. population from 1948 to 1964, and those which continued from 1964-71. A comparison of the two periods shows that the typical overall growth rate of net assets in the later period was considerably higher than that for the earlier years (11.8% p.a. as against 9.0% p.a.).[4] However, the rate of growth by means other than takeover (net new investment in fixed assets, and in net current assets) was actually slightly lower in the second period.[5] The increase in the rate of net asset growth may be wholly attributed to the increased expenditure on new subsidiaries. Moreover, in the second period this external component

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4. This assumes that the change of population between the two periods does not distort the comparison. The change in the basis for valuing takeovers in 1964 (see footnote 2 above) does exaggerate the increase both in the rate of growth of net assets and in the rate of growth by takeover.

5. See the discussion in chapter 2 of the arbitrariness of the distinction between net and replacement investment; and on the typical shortfall of replacement investment below depreciation.

of growth exceeded the internal components:[6] it alone contributed 6% p.a. to the growth rate of the typical company.

In fact this analysis of the growth pattern of the typical company may be said to understate the importance of takeover to the company sector; for it gives equal weight to the experience of each individual company, irrespective of its size, whereas, as appendix C shows (and the aggregates in Table 6.A. reflect), takeover is relatively more important than average to the small number of giant companies which dominate the company sector.[7]

c. Summary

Expenditure on new subsidiaries has been rising dramatically over the post-war period, until in the years 1964-71 it accounted for slightly over half of the net asset growth of the typical company, exceeding even net investment in fixed assets. Moreover, the relatively great reliance on takeover by giant companies, documented in appendix C., means that averages of the growth variables weighted by size would reveal an even greater role for growth by takeover than appears in the unweighted averages given here.

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6. This only applies when the internal components are measured net of depreciation. As the aggregates in Table 6.A. show, gross new investment typically exceeded expenditure on takeovers.

7. The largest 100 companies accounted for roughly two-thirds of the net assets of the D.I. population at the end of the period: see appendix C.

TABLE 6.A.

AGGREGATE EXPENDITURE ON NEW SUBSIDIARIES AND ON GROSS NEW INVESTMENT IN FIXED ASSETS: THE 893 COMPANIES WHICH CONTINUED IN INDEPENDENT EXISTENCE WITHIN THE D.I. QUOTED COMPANY POPULATION FROM 1949 TO 1969.

Year	Expenditure on New subsidiaries I £ million	Expenditure on Gross new investment II £ million	I as a percentage of II
1949	13	176	7
50	11	187	6
51	-25	213	-12
52	11	222	5
53	36	238	15
54	72	304	24
55	60	382	16
56	76	509	15
57	86	529	16
58	83	502	17
59	201	464	43
60	202	570	35
61	243	725	34
62	344	707	49
63	251	746	34
64	341	869	39
65	328	1075	31
66	228	996	23
67	482	1061	45
68	1295	1244	104
69	628	1427	44
Aver-ages:			
1949-55			9
1956-62			30
1963-69			46

Notes:

Derived from own computations using Edinburgh Data Bank (no consistent series is available giving this information in published government statistics).

The basis of valuation of expenditure on new subsidiaries changes to a less conservative method in 1964: see appendix D.

Expenditure on gross investment includes investment financed with investment grants: companies often net these grants out of investment; but they are added back by the D.I. as part of their standardisation procedures.

TABLE 6.B.

THE CONTRIBUTION OF TAKEOVER AND NET NEW INVESTMENT IN FIXED ASSETS TO THE GROWTH OF THE TYPICAL COMPANY, 1948-64 AND 1964-71.

	1948-64		1964-71	
Rate of growth:				
by net new investment in fixed assets	3.7		4.4	
by acquisition of net current assets	2.4		1.4	
together = by internal means		6.1		5.8
by acquisition of subsidiaries:				
1. for cash and by share for share exchange	2.1		4.9	
2. by taking on minority interests and long term liabilities on acquisition	0.8		1.1	
together = by external means		2.9		6.0
of total net assets		9.0		11.8
Depreciation (identical with replacement investment)		3.8		4.5
Number of companies		1250		966

Notes:

All variables are simple averages across all company-years.
All variables are expressed as a percentage of opening net assets before averaging.
Table 6.A. reported gross new investment in fixed assets (net new investment plus depreciation as given here); and excluded minority interests and long term liabilities acquired with new subsidiaries from expenditure on takeovers.
The acquisition of subsidiaries is valued on a more conservative basis prior to 1964: see appendix D.
For fuller definitions see appendix F.

Chapter 7. The Consequences of Merger for Company Performance, 1: profitability after merger

a. Introduction

The last chapter illustrated the importance in recent years of take-over as a means of growth for the typical U.K. quoted company, and especially for the biggest U.K. companies. This and the next two chapters examine some consequences of takeover: they concentrate in particular on its impact on productive efficiency.

Takeover has been cited as an important disciplinary force by those[1] who have acknowledged the failure of the traditionally-invoked control mechanisms which would operate were product, input and capital markets perfect. It could work in two ways. On the one hand, the threat of takeover (and loss of office or power for directors) if profit were to fall could constrain directors from indulging in the discretion allowed them by imperfect product and capital markets, to the detriment of profitability. On the other hand, the actual takeover of new subsidiaries by very profitable firms, which elicited greater profits from the assets of their victims than the victims' own directors would have achieved, could also act as a control on the decline of profitability.

Singh's (1971) study of takeovers in the U.K. in the fifties provides evidence on the first mechanism. He found that in the years prior to their acquisition, a majority of takeover victims performed less well than the industry average in terms of profitability. However,

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1. E.g. Marris (1964).

the majority was typically rather small; and he concluded that only a weak tendency existed for firms with below average profitability to be taken over.

The second mechanism, whereby the victim's profits were higher after takeover than they would otherwise have been, could operate in a number of ways. On the production side, scale economies in production and administration might become available to the combine. A reduction in market uncertainty might stimulate decisions to invest in new cost-reducing capacity. Where excess capacity existed in an industry, unit costs might fall as output was concentrated in existing least-cost plants. Or more able managements might just use existing assets more efficiently. Benefits could also accrue to the new combine as a result of its increased weight in the market, both in relation to its customers and its suppliers: sales and purchases might be conducted on more favourable terms.

As against this, the actual process of integrating two companies might exact a resource cost.[2] Or administrative slack might develop because the merger[3] had caused competitive pressures to be relaxed.

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2. Such problems of expanding the management team are emphasised by Penrose (1959) in her account of the limits on a company's rate of growth.

3. "Takeover" and "merger" are used here interchangeably as in much of the literature, simply to relieve monotony. In fact all the amalgamations considered here would fall under the strict definition of takeover (acquisition by one existing company of another).

If firms' internal efficiency were unchanged as the result of a takeover, then, since their market position is prima facie improved by the merger, their profitability would more likely than not (and ceteris paribus) improve.[4] If the typical amalgamation were also able to reduce the resource costs of its output, its relative profitability would have further reason to improve. On these grounds, we might expect profitability, a joint function of internal efficiency and market power, to improve following most mergers. If, however, profitability[5] typically declined after merger, then it might reasonably be inferred that the negative effects on the production side had the upper hand; whilst unchanged profitability would leave the conclusion indeterminate (with a suspicion of decreased efficiency, since market power would typically be enhanced), and so even would increased profitability. The study reported below is devoted to charting the post-merger profitability of amalgamations effected in recent years; and to providing tentative conclusions on whether gains or losses in productive efficiency have more often resulted from merger.[6]

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4. Chapter 8 below distinguishes between the likely effects of different types of merger (e.g. diversified as opposed to same industry) and provides evidence on the success of different types.

5. Other things equal, of course.

6. Other consequences of takeover, apart from those for productive efficiency, are considered in chapters 9 and 10. Pride of place is given to the efficiency consequences because government policy has carried such a strong presumption that they would be favourable (see section 7.b. below); as chapter 10 argues, many of the other consequences are probably unfavourable, and have been tolerated by the state because they were believed to be mitigated by efficiency gains.

b. Government policy on mergers

Such conclusions could be of considerable help in the formulation of government policy towards mergers - especially in creating a presumption either for or against takeover. If the presumption is in favour, then only the minority which pose marked difficulties for the public interest need be investigated thoroughly; if it is against, then only companies which believe they can demonstrate social benefits to be derived from the merger will present themselves for detailed examination. It might be argued that each case should be thoroughly investigated by public scrutineers and decided on its merits; but the resource cost of such an examination in every case, and of the subsequent monitoring necessary to see promises and commitments carried out, would be disproportionate given the merger rate. For instance, in 1968, a peak year for takeover activity, over 100 companies with a value over £500,000 were taken over (D.T.I. (1970)).

At the time of most of the mergers studied below, government policy harboured a presumption in favour of merger activity: this can be seen both in its preaching and in its practice. 'In general, mergers are desirable if they lead to better management or genuine economies of scale without eliminating workable competition. In my view more often than not in Britain mergers will fulfil this condition,' maintained the President of the Board of Trade in 1969.[7] And in that government's lifetime prospective mergers were referred to the Monopolies Commission at the rate of only two a year (a minority of these

7. Cited in George (1971), p.155.

being ultimately found to be against the public interest).[8] Alarmed at the permissiveness of government policy, some economists argued that the presumption should be reversed;[9] and that, following the precedent of the 1956 Restrictive Trade Practices Act, companies be required to demonstrate mitigating factors in their proposal, if not positive benefits. There is some evidence of a hardening of government attitudes recently, though not to the extent prescribed by some industrial economists. In 1973 the Minister for Trade and Consumer Affairs expressed scepticism over the alleged benefits from merger activity; and in 1973/4 the annual rate of reference of mergers to the Monopolies Commission reached 5.[10]

c. <u>The hypotheses</u>

The ideal would be to compare the profitability achieved by a company after takeover with the weighted average profitability that would have been achieved by the participant companies had the takeover not taken place. The approximation to this ideal which has been attempted here consists of comparing the profitability achieved by the amalgamation after takeover with the weighted average of the participants' profitability prior to merger. Two complementary null hypotheses are tested:

I. that, other things equal, the average profitability of the amalgamation is no different from the pre-merger level of the participants;

II. that, other things equal, half of amalgamations experience an improvement in profitability, and half a decline after merger.

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8. See Office of Fair Trading (1974), paragraph 45.

9. E.g. Sutherland (1971).

10. See Office of Fair Trading (1974), paragraph 45.

Two types of adjustment have been made to the conventional measure of the firm's profitability in order to allow for systematic influences on profit other than merger, and hence to hold other things as near equal as possible. Firstly, allowance has been made for changes in the companies' environment during the period when profitability is measured. This is because the average level of profitability is known to vary with the trade cycle;[11] and some industries are known to be more sensitive than others to these cyclical fluctuations. At the same time, the level of merger activity has displayed a marked unevenness between years and between industries; so that, for reasons not directly associated with merger, years of numerous mergers may have been followed by years of above or below average profitability; and even if this has not been the pattern for the whole company sector, it could still have operated for some individual industries. A simple expedient has been adopted to 'remove' the external influence of the macro-economic and industry environment: expressing conventional profitability as a proportion of the current year's profitability of the industry in aggregate.[12] Where a company in one industry acquires a subsidiary from another, the yardstick adopted is a weighted average of the two industries' profitability,

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11. See, for example, Nield (1963).

12. The aggregate rate of profit for the industry was obtained from Department of Industry (1971-5). The industry figure includes the companies under observation, so that differences between the companies studied and their industry figure will be smaller than those between the companies studied and the rest in their industry (see appendix H for industry profit rates).

the weights being the proportionate contributions of each of the merging companies' net assets to the amalgamation's net assets. The second step taken to hold other things equal has been to remove an accounting bias which frequently arises after takeover in the conventional measure of profitability. This occurs because acquirers often pay more for victims, and record the subsidiary's assets in their own books at a higher valuation, than that at which they appeared prior to takeover. This inflates the net assets of the amalgamation compared with the joint total of victim's and acquirer's net assets prior to merger (and had the merger not occurred), and deflates the profitability measure which has net assets as its denominator. Appendix D. deals with this problem in greater detail, outlining the adjustment adopted below to yield an alternative profitability measure which should be largely free of this accounting bias.

Thus the actual null hypotheses being tested can be summarised:

I. $E = 0$; $H = 0$

(i.e. profitability did not change from its pre-merger level).

II. $P = 0.5$; $Q = 0.5$

(i.e. as many companies recorded improvements in profitability as recorded declines).

Where:

$$E_{zj} = R_{zj} - R_{zk} \qquad (7.i)$$

$$R_{zj} = R_{mj} \div (xR_{nj} + (1-x)R_{sj}) \qquad (7.ii)$$

$$R_{zk} = \frac{1}{3} \sum_{l=y-3}^{y-1} \left[\frac{2(U_{vl} \div U_{bl})}{D_{vl-1} + D_{bl-1} + D_{vl} + D_{bl}} \div (xR_{nl} + (1-x)R_{sl}) \right] \qquad (7.iii)$$

$$R_{mj} = \frac{2U_{mj}}{D_{mj-1} + D_{mj}} \qquad (7.iv)$$

and:

U = pre-tax profit, after depreciation

D = net assets

z = amalgamation, as proportion of industry-year

j = a post-merger year (including the year of merger)

k = average of three pre-merger years

m = amalgamation

$$x = \frac{D_{vy-1}}{D_{by-1} + D_{vy-1}}$$

n = victim's industry

s = acquirer's industry

y = year of merger

v = victim

b = acquirer

Note:

1. H is defined in the same way as E, except that R_{mj} is adjusted for the accounting bias: see appendix D.

2. P is the proportion of observations for which $E < 0$.

3. Q is the proportion of observations for which $H < 0$.

4. The pre-merger reference period is set at three years in order to summarise average performance over a run of years prior to the merger.

It seems unlikely in fact that the results would be very sensitive to the choice of reference period: for instance, if the single pre-merger year were adopted instead, R_{zk} would be similar to that actually used, since the victim's profitability in that year is slightly below its 3 year average, while the acquirer's is slightly above (see section e. below).[13]

The hypotheses have been presented in this formal way for clarity. The presentation follows a pattern which is common in statistical testing of theories, and conventional tests for statistically significant changes in profitability are reported below. However, a caveat is required on the interpretation that may be given to these tests and on the population to which any results may be applied.

The chapter does not consider a representative sample of all companies (or even of all British companies) for this period. They are the larger British companies; and many theories (especially the managerial ones) would suggest that their objectives and behaviour might differ in important respects from smaller companies: in particular, they are all quoted companies and might well find the financing of takeover much easier than non-quoted companies (see chapter 9 on the role of share for share exchange). Given the evidence of chapter 6 it is difficult to argue even that this study uses

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13. Table H.A. in appendix H. shows that the "amalgamation's" profitability in the year preceding merger was the highest of the three pre-merger years.

    The choice of a three-year period is somewhat arbitrary. The longer the period the weaker the impact of temporary disturbances to profitability, but the more companies are excluded on account of having had mergers in the reference period; three years was a pragmatic compromise.

a (not untypical) sample of the infinite number of years' experience for larger quoted British companies: this period witnessed unprecedentedly frenetic levels of takeover activity, and it is possible that the causes and consequences of most takeovers in this period differed from those of other periods.

The results are perhaps best seen as descriptions of the specific universe of larger British quoted companies in the late sixties and early seventies (the question of whether the selection criteria detailed below produce an atypical subset of even these mergers is taken up later); and strictly, probability statements will then be inappropriate. Statistical tests are nevertheless reported below as useful adjuncts of the description. For they provide a conventional account of the relative dispersion of the observations; and this can be a useful control on the interpretation of the averages reported below. For instance, the relatively high dispersion of observations discovered below for the full set of observations, and reflected in the failure of differences in profitability to pass conventional tests of significance, acted as a useful alert that the means were unduly influenced by extreme observations.

The results are therefore all reported in the past tense, as a description of a specific universe. In the absence of contrary evidence it is perhaps not unreasonable to presume that this description may also apply to subsequent mergers among similar companies. Certainly the fact that Singh (1971) reported similar results for the fifties for British quoted companies will encourage this presumption.

d. <u>The takeovers selected for study</u>

All the takeovers studied satisfy the following conditions:

1. The acquirer and victim both belong to the population whose accounts are included in the Edinburgh Data Bank (see appendix F. for details of the population).[14]

2. The takeover took place between 1964 and 1972 (fuller details of takeovers were provided by the Department of Trade and Industry from 1964).

3. Both acquirer and victim had at least three years' data available prior to the merger year (so that the reference level of profitability could be computed).

4. Neither victim nor acquirer took over any other quoted company in either the pre-merger reference period or (in the acquirer's case) in the post-merger study period (changes in performance can then more readily be attributed to the single merger event). Where the acquirer took over another quoted victim after the first merger, the study period for that acquirer is terminated in the year before the second merger; otherwise the acquirer's record is traced for every year until its death or the end of its record in the data bank.[15]

233 acquisitions qualified for study on these criteria. They repre-

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14. Typically only one victim was taken over; but when two or more victims from the same industry were taken over in the same year, their records were amalgamated, and they were treated as a single victim: there were five such cases.

15. Chapter 9 abandons this (statistically convenient) restriction, and examines the record of <u>all</u> continuing acquiring companies.

sent roughly one-third of the cases of takeover by one quoted company of other quoted companies during this period.[16] The length of the acquirer's record after merger clearly varies from case to case; the numbers surviving for different periods are:

Number of years after merger	Number of acquirers' records available up to that year	Percentage of total acquirers' records studied still available
0	233	100.0
1	211	91.7
2	191	82.0
3	161	69.1
4	113	48.5
5	73	31.3
6	50	21.5
7	23	9.9
8	3	1.3

The number of acquirers surviving to successive post-merger years falls quite steeply. This is chiefly because no data are available in the Data Bank for any year after 1972 (and the data for 1972 are incomplete: see appendix F.), so that fewer than eight years post-merger data are available for any merger which took place after 1964 (and, of course, the later the merger, the fewer post-merger years are available). 68% of the records are terminated for this reason; 15% because the acquirer took over another company in a subsequent year; and 13% because the acquirer was itself taken over; 3% were excluded from the population on the D.I.'s redefinition of membership criteria in 1969 (see appendix F.); and the remaining 1% (Rolls

16. Between 1964 and 1971 there were 596 company-years in which quoted companies acquired other quoted companies. 223 of the takeovers studied fell within this period: the remaining 10 cases studied fell in 1972 when data for the full population are incomplete.

Royce and Lines Bros.) on the appointment of a receiver. Thus the decline in the number of records available in successive years does not reflect any disastrous death rate among acquirers - a result which would itself be very relevant to the issues considered here.

e. <u>The pre-merger characteristics of victims and acquirers</u>[17]

Table 7.A.a expresses the average size of victims and acquirers in the pre-merger year as a percentage of the population average[18] for that year. In every year the victims studied were a good deal smaller than the population average - typically less than half the size of the average member of the population. The acquirers on the other hand were bigger than average in every year.[19] These results are consistent with Singh's (1971) findings on the relative size of merger participants in the fifties.

For each of the acquisitions studied, the net assets of the victim in the year preceding takeover were expressed as a percentage of the sum of the victim's and the acquirer's net assets in that year. The average value of this percentage for all the takeovers studied was 25%: in other words the merger typically represented growth of

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17. This description applies not to the entire 233 cases selected above, but to a subset of 213, to which most of the subsequent analysis is confined: 20 cases with extreme observations were excluded at an early stage of the analysis (see below, section f).

18. The averages were computed from Department of Industry (1971-5). Since these population averages include the sample companies, the differences between these companies' records and the rest's will be greater still than the differences recorded here.

19. The percentages are lower for both groups after 1969 than before. This is probably due not to a fall in the size of participants, but to the sharp rise in the average size of the D.T.I. population after the 1969 rebasing (see appendix F).

around a third for the acquirer. This compares with a net asset growth rate of around 12% p.a. in this period for a typical member of the quoted company population.[20]

Table 7.A.b. expresses the participants' profitability prior to the merger as a percentage of the profitability of their industry-year. The pooled average for the victims for the three pre-merger years is slightly greater than 100%: in other words the typical victim performed slightly better than the industry according to this criterion. The level in the year immediately prior to merger is slightly below average, on the other hand. However, the levels in all three years are very close to 100%: in no year is a difference recorded which is statistically significant at the 5% level. The typical victim may be characterised as an average performer in terms of profitability.

This description could not be applied to the typical acquirer, which outperformed its industry by a clear margin: its profitability was in the region of a quarter higher than average. Moreover, the dispersion of observations does not call into question this average result: in each year the acquirer's average profitability was significantly different from 100% at the 1% level.[21]

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20. The net assets of the 966 continuing members of the population in the period 1964-71 grew by an average of 11.8% p.a.

21. These conclusions may not be taken as generalisations for the whole populations of victims and acquirers if the criteria on which this subset has been selected (see above) have produced an atypical group of merger participants: see the discussion below (section g.).

TABLE 7.A.

a. The average size of victims and acquirers as a percentage of the average for the Department of Trade and Industry quoted company population.

Year	Victim's size %	Acquirer's size %
1964	31	162
1965	42	376
1966	66	138
1967	33	175
1968	49	220
1969	45	140
1970	28	108
1971	18	104
1972	25	103

Note: net assets is used as the size measure.

b. The pre-merger profitability of victims and acquirers as a percentage of the profitability of the company's industry in aggregate for that year.

Year	Victim %	Acquirer %
y - 3	103.4	118.3[a]
	(43.8)	(47.1)
y - 2	104.0	124.9[a]
	(54.6)	(46.0)
y - 1	96.7	126.2[a]
	(66.9)	(48.9)

a. significanctly different from 100% at the 1% level. The standard deviation appears in brackets beneath the mean.

y = year of merger

average profitability for the three years pooled:

	Victim	Acquirer
	101.4	123.1

See appendix H for the weighted average of both participants' profitability in the years before merger.

f. Post-merger performance

Section I of Table 7.B. reports the typical change in the unadjusted profitability of the whole sample of selected amalgamations after merger. In the year of merger a slight improvement in profitability is typically recorded, with less than 40% of the sample recording a decline in the profitability measure used here.[22] In all subsequent years, however, an average decline is reported. The scale of the decline is considerable, amounting in some years to more than half the level of profitability achieved by the industry. However, the dispersion of values for the change in profitability, reflected in the standard deviation of E, is enormous; and consequently the change is in no year significantly different from zero at the 5% level.[23]

Given the large standard deviation of E, it seemed possible that the estimate of E's average was heavily influenced by a small number of extreme observations. If this were so, and if these extreme values were due to special factors unconnected with merger,[24] then the averages reported could be seriously misleading indicators of the effect of merger on profitability. Ideally, outliers would be

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22. But see section g. on the measurement problems which affect results for the year of merger.

23. Nevertheless, the nonparametric statistic P, the proportion of amalgamations showing a decline in profitability, which is not sensitive to outlying observations, confirms that a majority did display a decline; and this majority is in some years significantly different from 0.5 at the 5% level.

24. The potential significance of such outliers is illustrated in another context by Rowthorn (1975). A central objection in his critique of Kaldor's Law is Kaldor's inclusion of a single atypical and outlying observation in his sample.

excluded where prior knowledge was available that their extreme value reflected special circumstances. Such detailed knowledge of the characteristics of members of this sample was not available, however; and an expedient was adopted here of excluding cases where any individual observation of E exceeded a predetermined, but arbitrary limit. This was set at a change in profitability greater than 200% of the level recorded by the industry; and it involved the exclusion of 20 of the original 233 cases.[25]

As section II of Table 7.B. shows, the results with the outliers removed are much weaker in terms of economic significance (the mean decline is much smaller), but much stronger in terms of statistical significance (the dispersion of observations is much smaller and the null hypothesis of no change in profitability is rejected at the 1% level in five years, and at the 5% level in a further year).

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25. In fact the plea of special case can be sustained with prior evidence for a sizeable minority of the companies excluded: 5 belonged to the shipbuilding industry whose average profitability was so low in some years of the period (see appendix H.) that quite small absolute changes in R_{mj} (see 7.ii) would result in very big changes in R_{zj}, and hence in E_{zj}. The experience of these companies would then be magnified to have a quite disproportionate effect on the mean of E.

The proportion of 'failures' among these extreme cases is similar to that for the set of mergers with outliers omitted:

Year	y	y + 1	y + 2	y + 3
Percentage recording decline in profitability	40	58	76	73
	y + 4	y + 5	y + 6	y + 7
	80	100	100	50

Thus these extreme cases do not display records qualitatively different from those of the rest, but simply magnify the change reported, and have an unduly large impact on the averages across all cases.

TABLE 7.B.

THE CHANGE IN UNADJUSTED PROFITABILITY AFTER MERGER: ALL SELECTED COMPANIES: WITH AND WITHOUT OUTLIERS.

	I All cases				II Outliers omitted			
	E_z	S_{ez}	P_z	n	E_z	S_{ez}	P_z	n
y	0.038	3.179	0.378[c]	233	0.114[a]	0.105	0.371[c]	213
y+1	-0.168	2.158	0.582[c]	211	-0.053[a]	0.169	0.578[c]	192
y+2	-0.503	13.603	0.571	191	-0.035[b]	0.188	0.546	174
y+3	-0.369	4.942	0.565	161	-0.069[a]	0.236	0.541	146
y+4	-0.197	7.995	0.681[c]	113	-0.099[a]	0.237	0.670[c]	103
y+5	-0.567	10.590	0.658[c]	73	-0.109[a]	0.220	0.627[c]	67
y+6	-0.659	10.642	0.600	50	-0.068	0.236	0.545	44
y+7	-0.082	0.359	0.609	23	-0.073	0.316	0.619	21

Notes:

E_z = unadjusted profitability of the amalgamation (standardised for industry and year) - pre-merger profitability of the amalgamation (similarly standardised) (see definitions 7.i above).

S_{ez} = standard deviation of E_z across cases surviving to that year.

P_z = proportion of cases for which $E < 0$.

n = number of cases qualifying for inclusion in that year.

y = year of merger.

a. significantly different from 0 at the 1% level (using a t test).

b. significantly different from 0 at the 5% level.

c. significantly different from 0.5 at the 5% level.

The average values of R_z for the two sets of amalgamations for each year are given in appendix H.

The results are not reported for the eighth year after merger, for which only three observations were available.

The proportions experiencing declines in profitability are little affected by the exclusion of outliers (see footnote 23 above): in all years but the actual year of merger, the majority experience a decline, and this majority is statistically significant in 4 years. In subsequent comparisons it is assumed that the exclusion of outliers is justified, and attention is confined to the reduced set of 213 amalgamations.

Section II of Table 7.C. reports the results of the same tests when profitability is adjusted for the accounting bias (see above, section 7.c.); section I is a duplicate of section II of Table 7.B., which gives the corresponding results for unadjusted or "raw" profitability. Appendix D fosters the expectation that adjusted post-merger profitability will be higher than the raw version, and hence that, on the adjusted basis, improvements in profitability will be all the greater, with apparent declines reversed or at least mitigated. In the event, the improvement formerly recorded in the year of merger is enhanced; and while the subsequent declines are in no year reversed, they are in several years smaller.[26] Consequently, the null hypothesis of no difference is no longer rejected in years y+1 and y+2 as it was when the unadjusted measure was used. By and large, then,

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26. y+5 and y+6 actually show a slightly larger decline. This can arise under the estimation procedure detailed in appendix D when the acquiring company writes off goodwill already existing in the victim's balance sheet. This reversal of the usual bias is, however, likely to be of minor proportions and relatively infrequent (see Lee (1974)).

TABLE 7.C.

THE CHANGE IN PROFITABILITY: BEFORE AND AFTER ADJUSTMENT FOR THE ACCOUNTING BIAS.

	I Raw profitability				II Adjusted profitability			
	E_z	S_{ez}	P_z	n	H_z	S_h	P_z	n
y	0.114[a]	0.105	0.371[c]	213	0.148[a]	0.106	0.338[c]	213
y+1	-0.053[a]	0.169	0.578[c]	192	-0.015	0.172	0.536	192
y+2	-0.035[b]	0.188	0.546	174	-0.010	0.192	0.517	174
y+3	-0.069[a]	0.236	0.541	146	-0.058[a]	0.237	0.527	146
y+4	-0.099[a]	0.237	0.670[c]	103	-0.098[a]	0.234	0.660[c]	103
y+5	-0.109[a]	0.220	0.627[c]	67	-0.110[a]	0.220	0.642[c]	67
y+6	-0.068	0.236	0.545	44	-0.067	0.235	0.523	44
y+7	-0.073	0.316	0.619	21	-0.073	0.316	0.619	21

The notes to Table 7.B. all apply here too; but in addition H_z is the counterpart of E_z when adjusted profitability (F_z) is used in place of raw profitability (R_z). The actual values of F_z are also given in appendix H.

the alternative results for the change in profitability modify, but do not seriously alter, the picture yielded by Table 7.B.; and this conclusion is confirmed by the proportions of companies suffering declines after merger.

It was shown above how drastically the mean change in profitability was altered when a few extreme observations were excluded from the average; moreover, it was pointed out that the procedure for omitting outliers was somewhat arbitrary. It remains possible that the average changes recorded in Table 7.C. are unduly influenced by a small number of observations at one or other extreme of the (albeit now truncated) range. For instance, the average decline in profitability recorded in all but the merger year might have resulted from a combination of unchanged profitability by the vast majority of the observed amalgamations and drastic declines by a tiny minority. The implications for, say, government policy might be different in such circumstances from the implications if a moderate decline were typically experienced by a majority of companies. The latter situation might support a mild presumption against merger in general; whereas the former might support a strong presumption against merger in the particular circumstances of those experiencing a steep decline (assuming that these special circumstances were identifiable), but leave the verdict open in the general case.

There is then an argument for examining the distributions which yielded the average changes reported in the tables. One feature of these distributions has of course already been reported: the proportion of observed changes below zero. This statistic does not suggest that (for the restricted sample) the average change in profitability was unduly influenced by outliers: a sizeable decline in average profitability was generally accompanied by a sizeable majority experiencing a decline (and vice versa). Figure 7.A., which gives a fuller picture of the distribution of H, reinforces this impression. There appears to be no tendency for observations to cluster at either the positive or the negative end of the range: the impression gained is of a fairly symmetric distribution centred at a value somewhat below zero in all but the year of merger (when it is centred rather above zero).

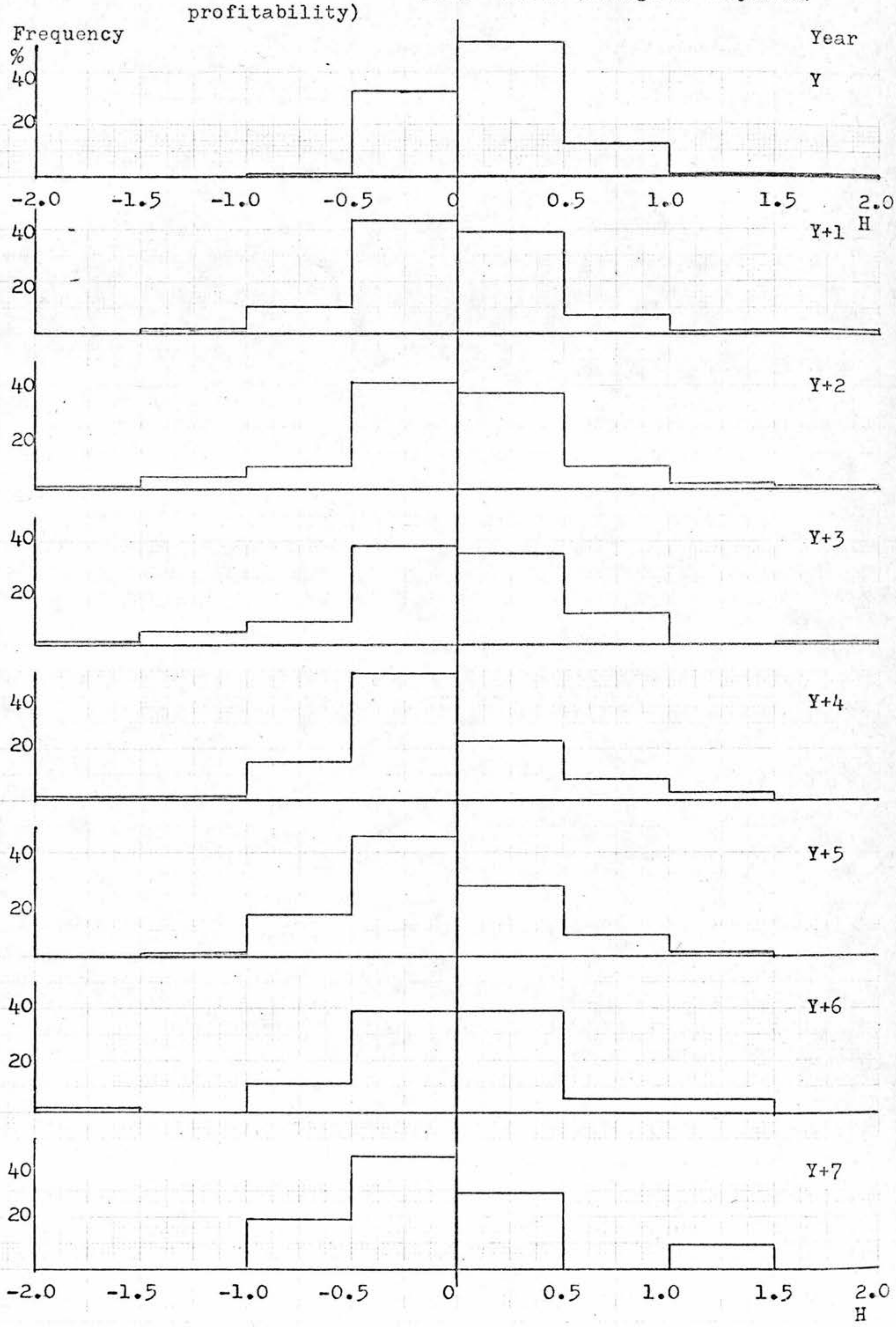
g. Conclusions

The description of the participants' pre-merger records showed that the typical victim was unremarkable in terms of profitability: on average its profitability was little different from that of its industry. The typical acquirer on the other hand achieved profitability substantially higher than the industry norm in the three pre-merger years. The fact that the acquirer was relatively successful, and that the weighted average of the acquirer's and victim's profitability (standardised for industry and year, as always) was typically displaying a slight upward trend[27] gave grounds for optimism that the post-merger performance of the amalgamation might typically excel that achieved by its elements prior to the merger.

In the event, the year of merger witnessed a marked improvement in profitability for the average amalgamation studied; and this improvement was all the greater when the accounting bias was removed which

27. See appendix H.

FIGURE 7.A. Frequency Distributions for H (Change in adjusted profitability)



often afflicts the profitability measure after a merger. There are, however, grounds for distrusting these results. It is argued in appendix D (footnote 1) that, in the year of merger, the rate of profit which is obtained on the usual definition (profit ÷ average net assets) can take on strange and unrepresentative values. This is because the numerator of the profit rate for the amalgamation typically contains a year's profit for the acquirer and a number of months' profit for the victim - the number of months depending on when, in the parent's financial year, the subsidiary was acquired. The denominator, on the other hand, will be an average of the acquirer's opening net assets and the consolidated (acquirer plus victim) closing net assets. Were the two companies not merged, however, the weighted average profit rate for the two companies would have a full year's profit for the victim in the numerator and the average of the victim's closing and opening net assets in the denominator. As is shown in appendix D, the profitability of the amalgamation may roughly equal the average of the rates that would have been achieved by the participants had they not merged if the acquisition takes place half-way through the parent's financial year. If the majority of acquisitions took place early in the parent's financial year, however, the profitability of the amalgamation which is used in the tables above would be unduly inflated.[28] The clerical effort of

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28. A further possibility is that acquiring companies indulge heavily in "window dressing" in the year of merger to reassure shareholders of the fruits of the merger. This would involve using any discretion enjoyed by the management in assessing profit to over rather than understate earnings (e.g. in the valuation of stocks and in the selection of bad and doubtful debts).

adjusting each amalgamation's record for this factor would be enormous, involving detailed study of each amalgamation's published accounts: and it has not been attempted here. However, the possibility remains that it might cause the improvement in the year of merger to be eliminated.

It is also possible that the adjustment might work the other way, of course, and that the improvement for this year would be enhanced thereby. However, the subsequent record of the amalgamations makes this seem unlikely; for, in every subsequent year the typical amalgamation experienced a decline in its standardised profitability. It would seem odd if gains in productive efficiency or market power which boosted profitability in the year of purchase were typically not only eliminated but actually reversed at the end of the financial year.[29]

For in all the seven subsequent years that were observed, profitability typically declined. This result held whether or not outlying observations were included; and before and after adjustment of profitability for the known accounting bias. In many of these cases the decline was statistically significant at the 1% or 5% levels. Admittedly, the typical decline was not enormous (for adjusted profitability it was only once over 10% of the industry level) and reservations must remain over experience in the year of merger; but given that profitability probably receives a fillip through merger from

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29. It is possible, but again unlikely, that it was the companies which did not survive to y+1 which were outstandingly successful in y, and tipped the balance, to yield an average improvement for all cases.

enhanced market power, there is quite strong evidence here to support a presumption that a limited loss of efficiency followed the typical merger.

One quite strong objection to the universality of this conclusion lies in the special nature of the mergers studied here, given the criteria used in their selection (see section d. above). These criteria were adopted for statistical convenience, and, for instance, exclude companies making very frequent takeovers: consequently it could be argued that those studied here may exclude the firms which were most successful at takeover. This objection is taken up below (chapter 10), after an examination of further aspects of takeover in the next two chapters.

h. Comparisons of the results with earlier work

Of three recent studies reviewed in appendix H which relate some measure of profitability to takeover activity, none finds that merger has a favourable effect on profitability. The tests were for two countries, for different periods, and were carried out in very different ways; moreover, they all suffer from drawbacks, which in most cases cast some doubt on the individual conclusions reached in the studies; nevertheless, their unanimity lends some support to the scepticism expressed here over the success of takeover in eliciting efficiency gains.

A recent survey by Utton (1974) also cites studies of merger success which have appeared in the American finance literature: the appendix argues (against Utton) that these are not by themselves very helpful on the central issue being studied here - of whether merger results in gains or losses in efficiency. The chief objection to relating them to this issue is that they fail to distinguish between general gains or losses in efficiency on the one hand, and, on the other, gains or losses in share values due to share exchange terms upon merger. They are more relevant to a discussion of distributional aspects of merger: in particular of which groups gain or lose (e.g. acquirers' shareholders, victim's shareholders, and either management).

The appendix also cites diverse other (non-financial) evidence of the effect of merger on efficiency, such as information from interviews: it is mostly unfavourable.

Chapter 8. The Consequences of Merger for Company Performance 2: the impact of diversification; Penrose effects.

Chapter 7 described the typical pattern of profitability after merger for all the companies studied. This chapter asks whether the pattern varies between particular subsets of these companies. If so, detailed government scrutiny could perhaps be directed at limited subsets of mergers whose performance has typically been poor in the past. On the basis of theoretical arguments two criteria are adopted here for distinguishing between sets of mergers: whether the victim is from the same, an allied, or an entirely different industry; and the size of the victim in relation to that of the acquirer.

a. Diversification and post-merger performance

(i) Introduction

The diversified merger prompts conflicting considerations for government policy. On the one hand it does not pose so serious a threat for market structure, since the combine's share of any one market is less likely to be enhanced than in the case of a merger of two former competitors;[1] indeed the victim may be better able to challenge existing dominant firms in its own industry as a result of the take-

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1. The impact of a merger upon market structure has been a dominating concern of monopoly and merger policy. The criteria for referring mergers to the Monopolies Commission under the 1965 Monopoly and Mergers Act were that the merger would produce or enhance a monopoly, or that the victim exceeded a certain size. The direct impact of merger upon productive efficiency (less readily measurable or verifiable of course) has generally been considered only as a mitigating factor when dealing with actual references. Of course, the presumption has until recently been that efficiency gains would generally be available and realised (see section 7.b. above).

over. On the other hand, where there are few overlapping activities the scope for some forms of economies will be limited; and the scope for an acquirer to apply superior expertise to raising the victim's profitability will be limited where this expertise is specific to the technology or markets of the acquirer's industry.[2] And consequently, in terms of the determinants of profitability discussed in the last chapter, there will typically be fewer gains to be had by diversified merger from increased market power, and fewer by increased efficiency.

The definition of a diversified merger is not free of problems. The expedient adopted here has been to use the Department of Industry's (D.I.) allocation of companies to Standard Industrial Classifications, and to call diversified the acquisition of a victim in one classification by an acquirer in another. Of course, the D.I. can only allocate a company to a classification on the basis of the majority of the firm's activities; and often one or both of the merger participants will already be diversified, with both of them sometimes active in the same industry.[3] However, no better information was available on which to classify the mergers; and so three groups were formed,

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2. It might be questioned why companies should be induced to undertake such mergers if the potential gains are so doubtful. Firstly, the special managerial skills of the acquirer may be in non specific areas - such as finance or labour relations - and could be readily applied to the victim's activities. Secondly, diversification might be a means of stabilising the profitability performance of the amalgamation through time, if the two industires' fortunes do not move in harmony over the trade cycle. A third, more sceptical account might stress the incentives to managers to achieve growth, even at the expense of profitability (see chapter 10 for a discussion of these incentives).

3. See the evidence for 1951 on diversification in National Institute of Economic and Social Research (1956); and some suggestive evidence that diversification has since proceeded apace in appendix C.

comprising mergers within the same 3 digit industry (102 of the 213 cases studied in chapter 7), those in the same 2 digit, but a different 3 digit industry (30), and those in other 2 digit industries (81).

The hypotheses developed above (section 7.c.) are again used; and the results are presented in a very similar form to those given in chapter 7. The change in profitability is reported using both the unadjusted and the adjusted measures described above, on the grounds that, while the adjusted measure is considered preferable, the adjustment procedure is unconventional, and parallel comparisons using the more usual (unadjusted) measure would act as a control on the conclusions, suggesting any oddities in the adjustment procedure.

(ii) The pre-merger characteristics of victims and acquirers

Table 8.A. details certain characteristics of victims and acquirers in each of the three groups as did Table 7.A. for all cases. Again the participants' size is expressed as a percentage of the average for the population in the same year.[4] For each of the three groups, as for the whole set of mergers, the acquirer is always bigger on average than the victim; and again, the average victim is in almost every year smaller than the population average, and the acquirer bigger. A comparison of the results for the three groups also suggests a weak tendency for the diversified acquirers to be biggest of the

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4. The population (rather than industry) average provides a common yardstick when victim and acquirer belong to different industries: the size of the victim relative to that of the acquirer is not then obscured by differences in the industry averages of size.

three groups on average.[5] Moreover, as section b. of the Table shows, the ratio of victim's to acquirer's size is smallest for the 'other 2 digit' group and largest for the 'same 3 digit' group.[6]

The participants' profitability record is detailed in section c. of the Table, and two conclusions reached for the whole set of mergers apply to each of the three individual groups. Firstly, the acquirer was typically more profitable than the victim prior to merger; and secondly, the acquirer was on average more profitable than the average for its industry-year. Again the victim was not greatly different from average in its profitability performance[7] (in none of the three pre-merger years, and in none of the three groups was the recorded difference from the industry reference level significant at the 1% level); although the 'same 3 digit' group performed rather less well and the 'other 3 digit' group better than average. Somewhat clearer distinctions emerged between the acquirers' records for the three groups: the 'other 2 digit' group clearly outpaced their industry, with profitability around a third higher than the industry (and levels

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5. Such a tendency would be the analogue of the tendency of larger companies to undertake more direct investment overseas - i.e. to diversify in terms of country - documented by Rowthorn (1971) p.66.

6. See below, section 8.b.(ii) for discussion of this association.

7. Though the 'other 3 digit' victims' average profitability was some 16% above average. However, individual observations were widely dispersed about the average, and the averages did not survive the significance tests used here as a control when interpreting the strength of differences.

TABLE 8.A.

THE CHARACTERISTICS OF MERGERS RELATED TO THE DEGREE OF DIVERSIFICATION

a. The average size of victims and acquirers as a percentage of the average for the Department of Trade and Industry quoted company population.

	Same 3 digit		Other 3 digit		Other 2 digit	
Year	Victim %	Acquirer %	Victim %	Acquirer %	Victim %	Acquirer %
1964	13	141	16	143	56	191
1965	33	386	7	82	59	407
1966	107	375	11	109	27	487
1967	44	214	30	275	8	107
1968	38	99	120	431	37	245
1969	31	76	61	237	51	332
1970	27	256	15	710	33	127
1971	13	30	15	360	27	346
1972	21	37	9	78	42	746

Note: net assets is used as the size measure.

b. Victim's net assets as a percentage of joint net assets in the year preceding takeover.

All cases	30	23	20
Number of cases	102	30	81

c. The pre-merger profitability of victims and acquirers as a percentage of the profitability of the company's industry in aggregate for that year.

y - 3	97.4	107.4	121.2	122.7	104.4	130.4[a]
	(35.9)	(48.1)	(52.5)	(47.1)	(50.1)	(44.0)
y - 2	98.3	115.9[a]	115.4	122.9	107.0	137.0[a]
	(39.8)	(51.0)	(48.7)	(49.2)	(76.0)	(37.0)
y - 1	89.6	120.6[a]	112.3	126.7[a]	99.9	131.1[a]
	(47.2)	(34.2)	(72.6)	(28.0)	(89.7)	(75.2)

a. significantly different from 100% at the 1% level.
y. year of merger.

The standard deviation appears in brackets beneath the mean.

Average profitability for the three years pooled:

3 years	95.1	114.6	116.3	124.1	103.8	133.5

See appendix I for the weighted average of both participants' profitability in the years before merger.

significantly different from the 100% yardstick at the 1% level in all three years); while the 'same 3 digit' acquirer typically performed least well prior to merger.

(iii) Post-merger performance

The change in profitability after merger for the three groups is presented in Table 8.B. (unadjusted basis) and Table 8.C. (adjusted basis). In fact no clear relationship emerges between post-merger performance and the degree of diversification. The worst record is that of the middling group, 'other 3 digit', which achieved both the smallest improvement in the year of merger (see section 7.g. above on the unreliability of results for this year) and reported the worst decline in each subsequent year reported (significantly different from zero at the 1% level in four of the five years reported for both unadjusted and adjusted profitability).

The comparison of the polar groups, 'same 3 digit' and 'other 2 digit' does not reveal strong differences in post-merger performance. This runs counter to the expectation (justified in section 8.a.(i) above) that the non-diversified merger would typically offer the best hope of improvements in profitability. Such weak differences as do emerge suggest rather that the diversified group performs the better of the two, recording improvements in adjusted profitability in two years apart from the merger year, while in only one year is a decline significantly different from zero (and then only at the 5% and not at the 1% level); whereas in every year but y and y+7 the non-diversified group records declines in profitability; and in three years the declines attain statistical significance.

TABLE 8.B.

THE CHANGE IN PROFITABILITY AFTER DIVERSIFIED AND NON-DIVERSIFIED MERGER: UNADJUSTED PROFITABILITY

	Same 3 digit				Other 3 digit				Other 2 digit			
	E_z	S_{ez}	P_z	n	E_z	S_{ez}	P_z	n	E_z	S_{ez}	P_z	n
y	0.161[a]	0.102	0.323[c]	102	0.013	0.146	0.433	30	0.092[a]	0.090	0.395	81
y+1	-0.053[a]	0.168	0.576	92	-0.110[b]	0.269	0.654	26	-0.035[b]	0.139	0.554	74
y+2	-0.027	0.221	0.549	82	-0.147[a]	0.191	0.680	25	-0.002	0.147	0.493	67
y+3	-0.083[a]	0.189	0.594	64	-0.277[a]	0.429	0.727[c]	22	0.022	0.201	0.417	60
y+4	-0.037	0.205	0.646[c]	48	-0.337[a]	0.168	0.846[c]	13	-0.096[b]	0.283	0.643	42
y+5	-0.118[b]	0.260	0.563	32	-0.374[a]	0.080	0.875[c]	8	-0.021	0.198	0.630	27
y+6	-0.156[b]	0.282	0.545	22					-0.036	0.121	0.571	21
y+7	0.021	0.212	0.500	10					-0.216	0.430	0.800	10

Notes:

Full definitions are given in Table 7.B. E is the average change in profitability, and S_e its standard deviation; P is the proportion of companies for whom $E < 0$; n is the number of cases contributing to the average; y is the year of merger.

a. significantly different from 0 at the 1% level.
b. significantly different from 0 at the 5% level.
c. significantly different from 0.5 at the 5% level.

The average values of R_z for the various sets of amalgamations for each year are reported in appendix I.

Only one 'other 3 digit industry' amalgamation survived after y+5; so no averages are reported thereafter for this group.

TABLE 8.C.

THE CHANGE IN PROFITABILITY AFTER DIVERSIFIED AND NON-DIVERSIFIED MERGER: ADJUSTED PROFITABILITY

	Same 3 digit				Other 3 digit				Other 2 digit			
	H_z	S_{hz}	P_z	n	H_z	S_{hz}	P_z	n	H_z	S_{hz}	P_z	n
y	0.200[a]	0.109	0.284[c]	102	0.068[b]	0.135	0.400	30	0.112[a]	0.089	0.383[c]	81
y+1	-0.009	0.175	0.500	92	-0.043	0.255	0.615	26	-0.012	0.144	0.554	74
y+2	-0.005	0.233	0.524	82	-0.099[a]	0.158	0.600	25	0.017	0.156	0.478	67
y+3	-0.069[a]	0.194	0.594	64	-0.265[a]	0.428	0.636	22	0.030	0.199	0.417	60
y+4	-0.044	0.200	0.646	48	-0.329[a]	0.177	0.846[c]	13	-0.089[b]	0.282	0.619	42
y+5	-0.122[b]	0.257	0.594	32	-0.369[a]	0.082	0.875[c]	8	-0.018	0.199	0.630	27
y+6	-0.157[b]	0.280	0.545	22					-0.033	0.122	0.524	21
y+7	0.021	0.213	0.500	10					-0.217	0.431	0.800	10

The notes to Tables 7.B. and 8.B. all apply here too; but in addition H_z is the counterpart of E_z when adjusted profitability (F_z) is used in place of raw profitability (R_z). The actual values of F_z are also given in appendix I.

b. Post-merger performance and the relative scale of victim and acquirer

(i) Introduction

A central proposition in the work of Penrose and Marris[8] has been that beyond a certain point increases in a company's growth rate will exact costs in terms of productive or administrative efficiency. These costs are reckoned to stem chiefly from the difficulties of assimilating additions to the management team. They are incurred in expansion by new investment and by takeover alike, it is argued.[9] This section examines the proposition with respect to growth by takeover, comparing the post-merger performance of different quartiles of amalgamations distinguished by the proportionate contribution of the victim to the amalgamation's net assets. On the basis of the managerial theorists' arguments one might expect a merger which represented very great proportionate growth for the acquirer to prompt greater problems and less favourable subsequent profitability performance than one which represented only slight proportionate growth.

In addition there exists a mechanical relation between the victim/amalgamation size ratio and the impact of merger on the amalgamation's profitability, if it is assumed that any change in profitability is either confined or positively related to the victim's assets. If it is confined to the victim's assets, then say a one percentage point decline in the return on the victim's assets will correspond to a $\frac{1}{3}$ point decline for the amalgamation if the victim is half the size of

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8. See Penrose (1959), p.212, Marris (1964), p.114-8.

9. See Marris (1964), p.123.

the acquirer, but to only a $\frac{1}{11}$ point decline if the victim is a tenth of the acquirer's size.

(ii) <u>The pre-merger characteristics of victims and acquirers</u>

Section a. of Table 8.D. reports the average size of the merger participants as a percentage of the population average for each of the four groups. The chief dissimilarities between the four groups are in the acquirer's size: typically, the smaller is X (the victim: amalgamation size ratio) the bigger is the acquirer. The differences in victim's size follow no such regular pattern, however: in only two of the nine years does the ranking by victim's size follow that by X, whereas in six of the nine years the ranking by X is the exact reverse of that by the acquirer's size. Two other features of these subsets emerge from sections a. and b. of the Table. Firstly, the takeovers in quartile A are often 'reverse' takeovers: in many years the typical acquirer is smaller than the typical victim, and on average the victim subscribes more than half of the amalgamation's net assets. Secondly, the acquirers in quartile D are typically enormous (roughly 5 to 10 times the population average and 10 to 100 times the victim average), while those in quartile A (and often those in quartile B too) are relatively small (in all years below the population average).

Section c. of Table 8.D. reinforces a suggestion made in section a.(ii) above. It shows the proportion of amalgamations in each quartile by X which belonged to each of the diversification categories used above. A majority of mergers in quartile A (high ratio of victim size to acquirer size) took place within the same 3 digit

TABLE 8.D.

THE CHARACTERISTICS OF MERGERS RELATED TO THE RELATIVE SIZE OF VICTIM AND ACQUIRER

a. The average size of victims and acquirers as a percentage of the average for the Department of Trade and Industry quoted company population.

	Quartile A		Quartile B		Quartile C		Quartile D	
Year	Victim %	Acquirer %	Victim %	Acquirer %	Victim %	Acquirer %	Victim %	Acquirer %
1964	53	45	18	40	24	140	13	424
1965	23	23	58	173	47	319	36	662
1966	53	60	173	224	17	124	37	890
1967	33	38	19	61	68	292	14	539
1968	66	67	54	107	50	296	20	452
1969	80	48	32	77	45	214	63	1009
1970	41	28	30	61	19	172	12	805
1971	16	15	24	75	11	70	22	557
1972	41	17	7	22	15	124	33	589

Note: net assets is used as the size measure.

b. Victim's net assets as a percentage of joint net assets in the year preceding takeover.

Quartile	A	B	C	D
All cases: mean	52	28	14	4
All cases: range	38-87	21-38	9-21	1-9
Number of cases	54	53	53	53

c. The relationship between diversification and the relative size of victim and acquirer (percentage of column total)

Industry \ Quartile	A	B	C	D
Same 3 digit	64.8	54.7	39.6	32.1
Other 3 digit	11.1	18.9	15.1	11.3
Other 2 digit	24.1	26.4	45.3	56.6

$$X = \frac{D_{vy-1}}{D_{by-1} + D_{vy-1}}$$ (see section 7.c. above).

Quartile A = top quartile by X
Quartile B = second quartile by X
Quartile C = third quartile by X
Quartile D = fourth quartile by X

industry; while a majority of the takeovers which represented only slight proportionate growth for the acquirer crossed the 2 digit industry barrier.

On the profitability side reported in Table 8.E. the middle quartiles, B and C, conform fairly closely to the pattern revealed for all cases in chapter 7 above. The two extreme groups, A and D, display some rather interesting differences from the average, however. On the one hand, for quartile A, where the victim was very large in relation to the acquirer, the participants have some of the features one would expect of a 'rescue' or disciplinary takeover: the acquirer's profitability is very high (significantly greater than zero at the 1% level in all three years, and more than 40% higher than the industry average) and rising; whereas the victim's profitability is nearly 20% below the industry average (again the difference survives the significance tests in all years), with some tendency to decline. On the other hand, in the case of quartile D, where a typically very large acquirer takes over a small victim, the pattern established by all the amalgamations studied (see chapter 7) is reversed: the acquirer's profitability is little different from the average for its industry-year, while the victim can boast clear superiority over its industry-year (a margin of some 30%, and one which is statistically significant at the 1% level in 2 of the 3 years). In other words, according to the criteria used here, a large mediocre company acquires a small successful one, often from another industry.

(iii) Post-merger performance

If attention is confined to the middle quartiles, B and C, then the records reported in Tables 8.F. (unadjusted) and 8.G. (adjusted)

TABLE 8.E.

THE CHARACTERISTICS OF MERGERS RELATED TO THE RELATIVE SIZE OF VICTIM AND ACQUIRER (CONTINUED)

The pre-merger profitability of victims and acquirers as a percentage of the profitability of the company's industry in aggregate for that year.

Year	Quartile A		Quartile B		Quartile C		Quartile D	
	Victim	Acquirer	Victim	Acquirer	Victim	Acquirer	Victim	Acquirer
y-3	85.4[a]	133.7[a]	102.1	114.7	99.7	118.4[a]	126.9[a]	106.2
	(24.1)	(64.7)	(41.2)	(52.5)	(41.3)	(33.3)[a]	(62.4)	(36.4)
y-2	86.0[a]	143.8[a]	104.3	117.7	86.9	128.8	139.3[a]	109.2
	(24.2)	(53.6)	(29.0)	(57.4)	(81.9)	(41.4)	(68.2)	(26.9)
y-1	80.4[a]	152.3[a]	94.5	124.3[a]	88.2	120.2	124.2	107.7
	(24.9)	(75.9)	(36.7)	(33.4)	(52.2)	(55.2)	(147.1)	(22.2)

a. significantly different from 100% at the 1% level.
y. year of merger.

The standard deviation appears in brackets beneath the mean.

Average profitability for the three years pooled:

3 years	83.9	143.3	100.3	118.9	91.6	122.5	130.1	107.7

See appendix I for the weighted average of both participants' profitability in the years before merger.

conform with the expectation outlined in section 8.b.(i) above. The quartile for which the takeover represented greater proportionate growth displayed the worst post-merger performance. In five of the post-merger years, quartile B experienced typical declines in adjusted profitability (Table 8.G.) greater than 15%; and in four of these years the declines were significantly different from 0 at the 1% level. Quartile C's declines on the other hand exceeded 4% in only 1 year; and only that year's decline was significantly different from 0 at the 5% level (not at the 1% level).[10] Moreover, for quartile C the number of companies reporting a decline in profitability represented a majority in only two of the eight years considered, whereas for quartile B a majority experienced a decline in all but the merger year.

Section 8.b.(i) above argued that the amalgamations in quartile A might be expected to suffer far sharper declines in profitability than those at the opposite pole, in quartile D, for two reasons. Firstly, the managerial theorists provide a convincing account of why moderate growth rates should produce relatively high profitability while very high rates of growth might beget difficulties for the maintenance of a creditable profitability record. Secondly, if it is assumed that any assimilation problems and consequent declines in profit will be some positive function of the size of the victim, then a victim which contributes a considerable proportion of the amalgamation's net assets

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10. Improvements in profitability recorded for Y, the year of merger, are positively related to X across all four quartiles. This is consistent with the view that these apparent improvements result from measurement error: the bigger the victim whose accounts distort the picture, the bigger the distortion in year y (see section 7.g. above).

will be expected to have a greater effect on the amalgamation's profitability than one which represents only a small fraction of the amalgamation's size.[11]

The comparative experience of quartiles A and D runs counter to this expectation, however. The takeovers in quartile A were characterised above as the acquisition by highly profitable companies of relatively unprofitable victims of similar size to themselves (often even bigger). Yet their performance after merger did not suggest that they were suffering from massive assimilation problems. Only years y+6 and y+7, to which very few amalgamations contributed, revealed a decline in profitability greater than 8%; of the preceding years, one shows an actual improvement in profitability (apart from the merger year, Y), and in only one does the decline pass the statistical test of significance at the 5% level.

It was expected that the amalgamations in quartile D (described above as typically resulting from the purchase of small successful companies by large ones with mediocre profitability records) would be relatively unaffected by the takeover. But they experienced declines in profitability possibly more severe than those in quartile A. Indeed, in four post merger years, the decline exceeded 9%. Also, as the distribution of H was generally a good deal narrower for quartile D

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11. A study by Kitching (1967: see appendix H) found a high incidence of failure among takeovers where the victim was very small in relation to the acquirer. However, even were, say, 10% profitability converted into a 10% rate of loss for the victim's assets after takeover, this would produce only a negligible effect on the amalgamation's profitability if the victim represented only 1% of the amalgamation.

than for quartile A, three of the declines were significantly greater than zero at the 1% level; and a further one passed this statistical test at the 5% level. Finally, the proportion experiencing declines in profitability was greater for quartile D than for quartile A in four of the eight years studied.

c. Conclusions to both studies

The study of separate subsets of mergers in this chapter had two objectives. The first was to see whether identifiable sub-groups of mergers displayed very different post-merger performance from the overall average reported in chapter 7. The second was to provide evidence on the impact of diversification and of Penrose effects. On the first issue, all seven of the sub-groups considered provided confirmation of the average picture reported in chapter 7. In the majority of post-merger years the typical amalgamation in any sub-group experienced a decline in profitability from the pre-merger level, whether or not profitability was adjusted for the accounting bias. Although the disaggregations performed here have not been exhaustive, it does appear that the average decline in profitability reported in chapter 7 was general over most types of takeover, and not the result of steep declines in an identifiable subset coupled with unchanged performance elsewhere.

No strong support was obtained for the very simple versions of the two hypotheses being considered, that more diversified mergers would be less successful in profitability terms, and that greater proportionate growth by merger would result in greater declines in profitability. The worst performance records were displayed by the middling groups,

TABLE 8.F.

THE CHANGE IN PROFITABILITY AFTER MERGER: QUARTILES BY SIZE OF VICTIM IN RELATION TO ACQUIRER: UNADJUSTED PROFITABILITY

Year	Quartile A				Quartile B			
	E_z	S_{ez}	P_z	n	E_z	S_{ez}	P_z	n
y	0.283[a]	0.148	0.204[c]	54	0.098[a]	0.122	0.340[c]	53
y+1	-0.114[a]	0.119	0.681[c]	47	-0.039	0.342	0.563	48
y+2	-0.028	0.185	0.610	41	-0.024	0.352	0.535	43
y+3	-0.091	0.345	0.618	34	-0.152[a]	0.312	0.563	32
y+4	-0.077	0.411	0.609	23	-0.182[a]	0.211	0.762[c]	21
y+5	-0.056	0.352	0.538	13	-0.218[a]	0.217	0.615	13
y+6	-0.121[a]	0.077	0.625	8	-0.258[a]	0.125	0.714	7
y+7	-0.245[b]	0.168	0.800	5	-0.212	0.432	0.667	3

Year	Quartile C				Quartile D			
	E_z	S_{ez}	P_z	n	E_z	S_{ez}	P_z	n
y	0.059[a]	0.063	0.396	53	0.013	0.050	0.547	53
y+1	-0.031	0.137	0.500	50	-0.032[a]	0.082	0.574	47
y+2	0.020	0.121	0.438	48	-0.114[a]	0.106	0.619	42
y+3	-0.013	0.230	0.477	44	-0.042[a]	0.081	0.528	36
y+4	-0.022	0.290	0.630	27	-0.125[a]	0.097	0.688[c]	32
y+5	-0.016	0.178	0.529	17	-0.146[a]	0.194	0.750[c]	24
y+6	0.181[b]	0.208	0.273	11	-0.124	0.338	0.611	18
y+7	0.037	0.364	0.333	6	0.016	0.438	0.714	7

Notes:

Full definitions are given in Table 7.B. E is the average change in profitability, and S_e its standard deviation; P is the proportion of companies for whom $E < 0$; n is the number of cases contributing to the average; y is the year of merger.

a. significantly different from 0 at the 1% level.
b. significantly different from 0 at the 5% level.
c. significantly different from 0.5 at the 5% level.

The average values of R_z for the various sets of amalgamations for each year are reported in appendix I.

TABLE 8.G.

THE CHANGE IN PROFITABILITY AFTER MERGER: QUARTILES BY SIZE OF VICTIM IN RELATION TO ACQUIRER: ADJUSTED PROFITABILITY

Year	Quartile A				Quartile B			
	H_z	S_{hz}	P_z	n	H_z	S_{hz}	P_z	n
y	0.339[a]	0.143	0.167[c]	54	0.140[a]	0.122	0.302	53
y+1	-0.046[b]	0.139	0.574	47	0	0.331	0.542	48
y+2	0.016	0.222	0.561	41	-0.005	0.323	0.512	43
y+3	-0.062	0.357	0.588	34	-0.153[a]	0.306	0.594	32
y+4	-0.078	0.411	0.609	23	-0.183[a]	0.206	0.762[c]	21
y+5	-0.057	0.353	0.538	13	-0.214[a]	0.213	0.615	13
y+6	-0.123[a]	0.078	0.625	8	-0.253[a]	0.117	0.714	7
y+7	-0.246[b]	0.168	0.800	5	-0.212	0.432	0.667	3

Year	Quartile C				Quartile D			
	H_z	S_{hz}	P_z	n	H_z	S_{hz}	P_z	n
y	0.081[a]	0.061	0.358	53	0.028[a]	0.048	0.528	53
y+1	-0.003	0.142	0.480	50	-0.011	0.084	0.553	47
y+2	0.038	0.124	0.396	48	-0.095[a]	0.110	0.619	42
y+3	-0.007	0.229	0.455	44	-0.032[b]	0.080	0.500	36
y+4	-0.029	0.286	0.630	27	-0.116[a]	0.097	0.656	32
y+5	-0.025	0.179	0.588	17	-0.141[a]	0.197	0.750[c]	24
y+6	0.179[b]	0.211	0.273	11	-0.120	0.340	0.556	18
y+7	0.037	0.364	0.333	6	0.015	0.440	0.714	7

The notes to Table 7.B. all apply here too; but in addition H_z is the counterpart of E_z when adjusted profitability (F_z) is used in place of raw profitability (R_z). The actual values of F_z are also given in appendix I.

those in allied but not widely diversified industries (other 3 digit), and those in the second quartile by X.

Perhaps the most interesting and promising conclusions emerge from incidental comparisons that were made - especially those between the pre-merger profitability of participants in a particular group, and the amalgamation's subsequent success. These comparisons are especially striking for the two sets of extreme groups (same 3 digit:other 2 digit; top quartile by X:bottom quartile by X). In each comparison, the group whose acquirers had the highest average profitability prior to merger achieved much less bad performance afterwards than had been expected of them (the diversified in the first study, and quartile A in the second). By contrast, the groups which, on apriori grounds, should have been best able to raise, or avert declines in, profitability (same industry; those involving small proportionate growth) displayed a poor record: and in both cases the acquirer's pre-merger record was the worst of the subsets being considered.

These features of the participants lend some support to a generalisation that an acquirer with a relatively successful pre-merger record will typically be more successful at subsequently improving or maintaining profitability after merger. Were this generalisation to be corroborated by subsequent work, then an implication for merger policy could be to add criteria of previous performance to those (market share and victim size) which have previously dominated decisions to refer prospective mergers to the Monopolies Commission.[12] A policy

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12. Confirmation of such a tendency would also weaken the support for one account of the decline in profitability after merger. This invokes the facts that acquiring firms tend to enjoy above average/

ill-disposed towards the acquisition of the strong by the weak might both inhibit the type of merger which more often results in efficiency losses and provide an incentive to increase efficiency for those companies intending to expand through merger.

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12. Contd.

average profitability, and that above average profitability tends anyway to regress towards the mean (see Whittington (1971), chapter 4 on this latter observation). Only if the post-merger decline exceeded the typical regression towards the mean associated with economic factors unrelated to the merger, would any decline be attributed to the merger. On this account it might be expected that acquirers with profitability considerably above average would typically record steeper declines than those with profitability around the average: but this chapter suggests the reverse.

Chapter 9. Further Aspects of Growth by Merger

a. Introduction

This chapter broadens the discussion of growth by takeover in three ways. Firstly, it examines the record of all acquiring companies in the Department of Industry population, comparing it with that of all non-acquiring companies. Secondly, it reports other features of the acquirers than their profitability: the sources and uses of funds, income allocation, and capital structure of companies are related to their rate of growth by acquisition; and, in particular, the means of financing takeover are considered, to complement part I of the thesis on the financing of new investment in fixed assets. Thirdly, the characteristics of acquiring companies are compared directly with those of companies which relied heavily on the major alternative means of expansion: new investment in fixed assets.

As chapter 7 argued, the comparison of pre- and post-merger profitability was restricted to a possibly unrepresentative subset of the population of acquirers: they had to have taken over no other quoted companies in the 3 year pre-merger reference period, and their subsequent record was terminated if they took over another quoted company in the post-merger study period. By including all continuing companies this chapter incorporates an important group which was left out of the earlier analysis, companies which made frequent takeovers. At the same time, the analysis in this chapter is less satisfactory than the earlier study in some ways. Firstly, it does not distinguish pre- and post-merger profitability: the average profitability over a period is related to the average rate of growth by acquisition in the same period. Secondly, the population studied is in one sense more restrictive than that for chapter 7: it only contains acquiring companies which survived a 16 or 7 year period, whereas survival for four years was the minimum requirement of the earlier chapter. Thirdly, in contrast with chapter 7, no satisfactory quantitative estimate is provided of the impact of growth by acquisition upon profitability (see footnote 4 below for a discussion of this relationship): this section of the work attempts only much narrower conclusions based on correlation analysis and the comparison of averages for broad sub-groups of the population. Chapter 10 brings together the results of this and the earlier work to provide a fuller view of takeover activity.

b. High, low and zero growth by acquisition

All the companies which continued as members of the D.I. population of quoted companies throughout either 1948-64 or 1964-71 are considered in this chapter. This section divides the population into three groups: those with zero growth by acquisition join one group ('zero') while the rest are divided into two groups, the one containing the top half when they are ranked by rate of growth by acquisition ('high'), and the other containing the bottom half ('low').

Table 9.A. summarises for each of the two periods the characteristics of these three groups (a much fuller description is provided in appendix J). A comparison of rates of profit, the key performance variable examined in chapters 7 and 8, shows that the zero growth group enjoyed the highest rate.[1] However, the high group's perform-

1. Unlike the measure used in chapters 7 and 8, profitability is not standardised for industry here (see the definition in appendix F). The industry influence is, however, taken into account when the correlation analysis reported below is applied to observations stratified by industry.

TABLE 9.A.

ANALYSIS BY RATE OF GROWTH BY TAKEOVER

	1948-64			1964-71		
	Zero	Low	High	Zero	Low	High
Rate of growth by takeover[1]	0	0.1	4.9	0	0.3	11.7
Pre-tax rate of profit[2]	18.6	17.6	18.0	19.2	16.1	18.1
Rate of growth by new investment:[1]						
gross	6.3	6.9	8.6	7.9	9.2	11.6
net	2.9	3.1	4.5	3.5	3.8	5.5
Rate of growth of net assets[1]	6.4	6.9	12.0	6.3	7.5	18.9
Rate of growth by external finance:[1]						
in exchange for subsidiaries	NA	NA	NA	0	0.2	7.7
for cash	NA	NA	NA	0.7	1.8	3.7
total	0.8	1.1	5.1	0.7	2.0	11.4
Rate of growth by retention[1]	5.3	5.2	5.9	5.3	4.6	5.8
Opening size (£ million)	0.754	2.935	2.859	5.181	15.201	12.737
Goodwill as a percentage of closing net assets	1.0	1.7	5.1	1.2	2.5	7.8
Number of companies	202	524	524	188	388	390

Notes:

All figures are simple averages across all companies within a group.

1. percent of opening net assets.
2. percent of average net assets.

For fuller results see appendix J, Tables J.C. to J.G.

For fuller definitions, see appendix F.

On the uses of funds side, the rate of growth of net assets (18.9% for high in period 2) comprises the rate of growth by takeover (11.7) plus the rate of growth by net new investment (5.5) plus the rate of growth by accumulating net current assets (0, but not shown here), plus the rate of growth by the acquisition of minority interests and long term liabilities when new subsidiaries are consolidated (1.7, but not shown here). On the sources side it comprises the rate of growth by retentions (5.8) plus the rate of growth by external finance (11.4) plus minority interests, etc. again (1.7).

ance according to this criterion was only slightly less good, and exceeded the average for all continuing companies in both periods (the overall average was 17.9% in 1948-64, and 17.5% in 1964-71); the low group is ranked lowest for profitability. Moreover, in the case of the groups growing by takeover, this conventional measure of profitability suffers from the accounting bias discussed in appendix D, and taken into account in chapters 7 and 8. The profitability denominator, net assets, is inflated by the goodwill arising on the consolidation of new subsidiaries.[2] The groups which grew by acquisition therefore had their profitability depressed by the accounting bias; and were it possible to satisfactorily adjust for this bias, the high group might well appear the most profitable.

The high group display marked differences from the other two groups in their pattern of financing growth. They relied much more heavily on new issue finance: for the zero and low groups, growth by external finance did not typically exceed 2.0% p.a. in either period (see Table 9.A.), whereas for the high group it was 5.1% p.a. in the first period, and 11.4% in the second.[3] Moreover, in the second period it was practically double the rate of growth that they attained

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2. As would be expected, the share of goodwill in closing net assets is positively related to the rate of growth by acquisition: see Table 9.A.

3. The change in the valuation of share issues in exchange for subsidiaries which was introduced in 1964 places a higher valuation on issues after 1964 than on those before (see appendix D).

   The minority interests and long term liabilities acquired with new subsidiaries are not included in this measure of growth by external finance: their inclusion would increase the relative importance of external finance for acquiring companies.

through retentions; a major proportion of this external finance was raised by share for share exchange during takeover. Retention finance, whose importance was emphasised so much in Part 1 of the thesis, was a much less decisive contributor to the differences in growth rate between the three groups: the difference between rates of growth by retention between the high and zero groups was of the order of only half of one per cent per annum.

Two of these results are somewhat surprising in view of the findings of earlier observers: that the high group achieved much more rapid growth than the others even though its rate of growth by retention was roughly similar to that of the others; and that its rate of growth by new issue finance was much the highest even though its rate of profit was not decisively superior. There are strong reasons for believing that a higher rate of growth is likely to be associated with a high rate of profit (see the discussion in chapter 3 above): other things equal, more retentions would be available to the more profitable firm for reinvestment, and the capital market would look more favourably on the relatively profitable firm in its allocation of new issue finance.[4] Empirical studies have confirmed

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4. The managerial theorists hpothesise a two way relationship between profitability and growth. Growth is presumed to depend on profitability for the supply of finance; and profitability is reckoned to be related to growth by a nonlinear relationship - positive in the lower range of growth, and negative in the upper range. A problem obviously arises in identifying one or other relationship from a scatter of observations on the two variables. Earlier empirical work has tended to attribute the observed association to the financing relationship (profit to growth) (see Whittington (1971), p.74). This chapter does not pursue the complicated statistical procedures which would be necessary to estimate the effect of profitability on growth and vice versa: the weak correlation found between profitability and growth by merger, together/

this expectation when they have reported relatively strong relationships in cross-section between the rate of profit and the rate of growth of net assets (Singh and Whittington (1968), chapter 7; Whittington (1971) chapter 5).

The results reported in figure 9.A. are both consistent with this earlier evidence and yet reinforce the suggestion made above that the relationship between profitability and growth by acquisition operates only weakly. This diagram summarises the results of correlating, industry by industry, profitability with firstly, the rate of growth of net assets, secondly the rate of growth by net new investment in fixed assets, and finally the rate of growth by acquisition (the latter two are of course components of the first, net asset growth).[5]

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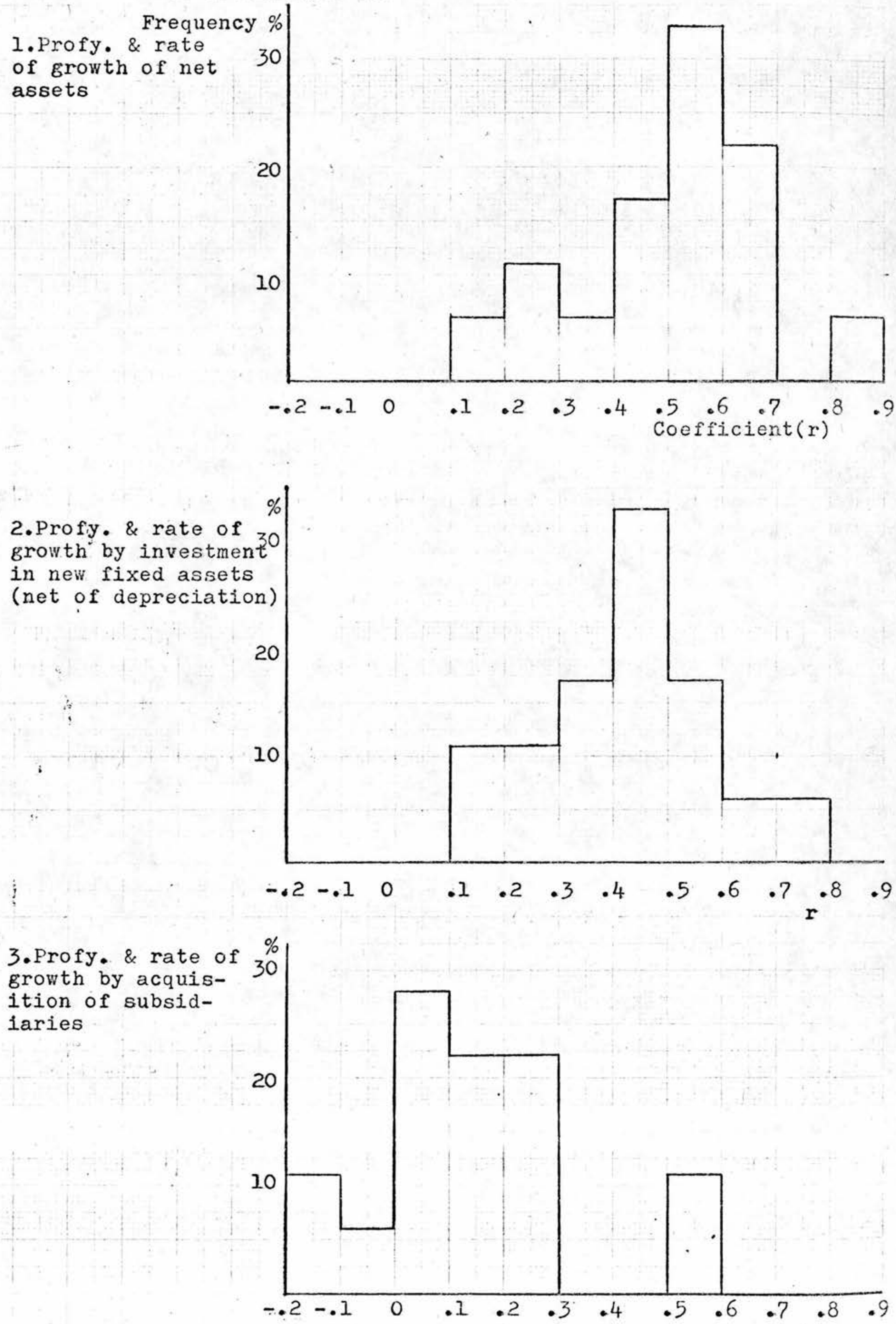
4. Contd.

together with the description of intensive acquirers given in section 9.c. are sufficient to answer the limited questions posed here. On the one hand they confirm that, when achieved chiefly by takeover, growth rates much above average could be (and often were) sustained without above average profitability; and on the other hand they confirm that very rapid growth by acquisition did not necessarily (and typically did not) result in profitability well below average. This latter topic is also considered in chapter 8, where the observation of changes in profitability over time avoids many problems in determining the direction of causation.

5. The use of a measure of investment net of depreciation may seem odd in view of the argument of chapter 2 above that net and replacement investment cannot be distinguished. It is adopted here because the net asset growth measure incorporates investment after depreciation; earlier work has used this net asset growth measure when relating growth and profitability; and the aim here is to contrast the results for growth by acquisition with those for total net asset growth in earlier work and for other components of net asset growth.

FIGURE 9.A. Frequency Distributions of Industry Correlations Coefficients: Profitability with Various Measures of Growth: 1964-71



For individual coefficients, see Appendix J, Table J.A.

In some respects this exercise is preferable to that reported in Table 9.A. For, on the one hand, stratification by industry removes the possibility that the conclusions drawn from Table 9.A. stem from the influence of a third factor industry, to which both growth and profitability are systematically related; and, on the other hand, the accounting bias which caused the conclusions of Table 9.A. for profitability to be qualified will affect alike the denominator (net assets) of both the ratios which are being correlated, and it is not clear that the correlation between the two biassed ratios will be any less strong than would have been the case had the ratios been unbiassed.[6]

The first section of the diagram confirms the results of earlier studies (see e.g. Whittington (1971), Table 5.3.): the distribution of correlation coefficients (one for each industry) clusters around 0.5. As the second section of the diagram shows, the distribution of correlation coefficients is similar when the correlation is performed instead for growth by new investment in fixed assets: the values cluster around a slightly lower value, but none falls below 0.1.[7] When the exercise is repeated for growth by acquisition, how-

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6. Consider for the sake of argument the extreme case of a perfect correlation with a one for one relationship between the variables: multiplying any of the paired observations by any factor will leave the correlation coefficient undiminshed.

7. Probably the closest relation would emerge between profitability and the residual component of net asset growth not considered here, the growth of net current assets. This is because retained profits for which no immediate use is planned are converted into bank deposits, etc. without any managerial initiative: retained profit is automatically translated into growth of this form when the net asset measure of growth is used. (This assumes of course that retained profits are exogenous).

ever, a different picture emerges (third section of Figure 9.A.): the correlation coefficients cluster around a value much closer to zero. In a minority of cases, a negative correlation actually appears; and for only 2 out of 18 industries does the coefficient exceed 0.3 (it exceeded 0.3 for 15 industries in the case of total net asset growth).

The evidence of Table 9.A. and Figure 9.A. together suggests that one of the control mechanisms which might be expected to operate in the growth process functions relativily weakly in the case of growth by takeover. For the dependence of growth upon profitability postulated by the managerial theorists (enforced by the automatic supply of retentions to the more profitable,[8] and by the presumed supply of external finance to them) would at least ensure, other things equal, that companies had to achieve above average profitability if they were to gain control over an increasing share of the economy. The relatively strong correlations reported in Figure 9.A. between profitability and growth by new investment suggest that this control may operate for that 'internal' form of growth. Table 9.B. reinforces this impression. It reports certain performance and financing ratios for three subsets of the continuing population distinguished this time by their rate of growth by gross investment in new fixed assets: having been ranked by this variable, the population is divided into thirds, with 'high' containing the fastest growing companies by this means, etc. The high group is in both periods a good deal more profitable than either of the other groups (with the

8. See chapter 3 above.

TABLE 9.B.

ANALYSIS BY RATE OF GROWTH BY GROSS NEW INVESTMENT

	1948-64			1964-71		
	Low	Middle	High	Low	Middle	High
Rate of growth by new investment:[1]						
gross	3.0	6.6	12.9	4.0	8.5	17.3
net	0.9	3.1	7.0	0.6	3.6	9.1
Pre-tax rate of profit[2]	15.8	18.1	19.9	14.8	17.7	20.1
Rate of growth by takeover[1]	1.1	1.6	3.5	3.0	3.6	8.0
Rate of growth of net assets[1]	5.5	8.0	13.3	7.4	9.6	18.5
Rate of growth by external finance:[1]						
in exchange for subsidiaries	NA	NA	NA	2.1	2.3	5.2
for cash	NA	NA	NA	1.0	1.7	4.3
total	1.0	1.9	5.4	3.1	4.0	9.5
Rate of growth by retention[1]	3.9	5.5	7.2	3.3	4.6	7.8
Opening size (£ million)	2.142	2.902	2.607	12.738	13.645	10.385
Number of companies	415	417	418	322	322	322

Notes:

All figures are simple averages across all companies within a group.

1. percent of opening net assets.
2. percent of average net assets.

For fuller results, see appendix J, Tables J.H. to J.L.

For fuller definitions, see appendix F.

low group performing worst on this criterion). The rate of growth by retention is positively and strongly related to the rate of growth by new investment; and the rate of growth by external finance very clearly follows the ranking by profitability, retentions and gross investment. Such clear patterns of precedence for the more profitable do not emerge for growth by takeover, however, either in Table 9.A. or in Figure 9.A.[9]

The high external growth group's similar rate of growth by retention and considerably more rapid growth by external finance secure for it an overall rate of growth of net assets much higher than that of the other groups (Table 9.A. again). Its rate of growth by takeover alone actually surpassed the other groups' rate of growth of total net assets in the second period. Moreover, in both periods the high group also achieved the highest rate of growth by new investment. However, the differentials between means for this variable (in the case of net investment not more than 2.0% p.a. greater than either of the other groups) were slight in comparison with those for growth by acquisition. As Table 9.C. shows, a considerable proportion of companies in the high external growth group belonged to the bottom third of the population by growth by new investment. Thus, while there is certainly no strong evidence that rapid growth by external and internal means were mutually exclusive, there is not strong support either for the view that they are mutually reinforcing.[10]

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9. See the further discussion of the finance control on expansion in chapter 10 below.

10. These conclusions relate to cross-section observations of sixteen and seven-year averages. It is still very possible that new/

TABLE 9.C.

THE PERCENTAGE OF MEMBERS OF THE HIGH GROUP ACCORDING TO GROWTH BY ACQUISITION IN EACH OF THE THIRDS RANKED ACCORDING TO GROWTH BY GROSS INVESTMENT IN NEW FIXED ASSETS.

Third by Investment	1948-64	1964-71
High	41.2	42.8
Middle	32.8	31.5
Low	26.0	25.6

Finally, Table 9.A. provides interesting information on the opening size of the three groups.[11] In fact, size emerges as an important distinguishing feature: in both periods, those with zero external growth have much smaller opening size than both the groups which grew by acquisition. This is consistent with the result in chapter 7 that the acquirer was typically of above average size, and with the conclusion of appendix C that giant companies enjoyed higher rates of growth by takeover than did the rest.

In this section attention has been focussed on the high external growth group, because only for its members was takeover a major means of expansion. The low group's typical member achieved only trivial growth by acquisition: the group averages for this variable were only 0.1% p.a. and 0.3% p.a. for 1948-64 and 1964-71 respectively, and the maximum values achieved by any member of the group were 0.9% and 2.2% respectively.[12] Again, the overall growth performance of

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10. Contd.

new investment and growth by acquisition may be alternatives to the individual firm in individual years - a possibility discussed in George (1972). If, as Penrose (1959) argues, there are limits on the sustainable growth of the firm, then growth by acquisition may sometimes come only at the expense of new investment. Moreover, when the prospects are bleak for new investment, the growth-oriented manager may give up any attempt at internal expansion, preferring the more secure alternative of growth by takeover. Such a situation would be the analogue of that described by Rowthorn (1971) for the multinational firm: when the home economy is sluggish and further acquisition of domestic companies is inhibited, the company may turn to investment overseas to satisfy its growth aspiriations.

11. See appendix C on the choice of opening size for analysis. purposes.

12. Given the D.I.'s method of deriving this figure, these trivial levels of growth by acquisition might represent not just the infrequent/

the low group was barely distinguishable from that of the zero group - its rate of growth of total net assets being only 0.5% p.a. higher in the first period, and 1.2% p.a. higher in the second. The next section continues with this emphasis on the high group, this time focussing on those in the high group with the most rapid growth by acquisition.

c. Intensive growth by acquisition

This section takes up again the topic considered in section 8.b.: the performance of companies with very high rates of growth by takeover, which might be expected, on the basis of the managerial theories, to suffer severe problems in assimilating their acquisitions. The same populations which have been divided into three subsets earlier in the chapter are this time divided into two groups by a ranking procedure: the top hundred by rate of growth by acquisition, and the rest. In addition, a similar division is made when the population is ranked according to rate of growth by gross new investment in fixed assets, so that the features of intensive external growth may be compared both with those of less rapid external growth and with those of rapid internal growth.

Section 9.b. above showed that if comparisons were confined to broad subgroups of the population, or if correlations were performed across

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12. Contd.

infrequent acquisition of relatively small subsidiaries, but also piecemeal purchases of shares which do not necessarily yield full control over other companies; or perhaps the net outcome of purchases and sales of subsidiaries.

the whole population, only a weak positive relationship emerged between profitability and growth by acquisition. In the light of the managerial theories, which argue that beyond a certain growth rate higher rates of growth will result in lower profitability, it seemed possible that the weak positive linear relation found between growth and profitability might have resulted from a scatter of observations actually conforming more closely to a nonlinear relationship, with higher profitability being associated with higher growth over the lower range of growth rates, but negatively over the higher range. This possibility was examined to some degree for single takeovers in section 8.b. above;[13] the results in Table 9.D. allow this discussion to be extended to high sustained rates of growth by acquisition. Again the results do not suggest that extremely rapid growth by acquisition entailed drastic assimilation problems which caused poor profitability performance: the top 100 by growth by acquisition enjoyed average profit rates above those of the rest (substantially higher in period 2).[14] Moreover, their profit rates were not (particularly in period 2) greatly different from those of the top 100 by growth by new investment (see Table 9.E.). Furthermore, the accounting bias discussed above and in appendix D, which deflates the reported profitability of active acquirers, makes the comparison of unadj-

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13. No strong support was found for the view that extremely high growth by merger was associated with unduly great subsequent declines in profitability.

14. Of course, no distinction is made here between pre- and post-merger profitability (see the caveat in section 9.a. above and the reconciliation with the results of chapter 7 which is provided in chapter 10 below).

usted profit rates relatively unfavourable to the intensive acquirers.[15 16] These results suggest therefore that some companies are able to sustain very high rates of growth by acquisition while maintaining above average profitability.

Their higher profit rate did also secure for the intensive acquirers a higher average rate of growth by retentions: almost one and a half times that of the rest in period 2 (see Table 9.D.). Nevertheless, in the light of section 9.b.'s findings for the three way division for growth by acquisition, it is not surprising to find that external finance (mostly raised in the course of takeover) fed most of the differential in growth rates: the intensive acquirers enjoyed rates of growth by external finance six or seven times those of the rest. The scale of their reliance on external finance was far greater than for the top 100 by new investment. The latter enjoyed considerably greater superiority over the rest in terms of growth by retention: more than double the rest's in period 2 and appreciably higher than that of the top 100 by growth by acquisition (10.6%:

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15. Goodwill represented a much larger proportion of closing net assets for the intensive acquirers than for the rest (see Table 9.D.; see also footnote 2 above).

16. The fact that the intensive acquirers had profitability above the average for all high external growth companies means, of course, that the other (non top 100) high acquirers appear in a rather less favourable light, with a rate of 17.9% in 1948-64, and 17.0% in 1964-71. These values are much closer to those of the low external growth group (Table 9.A.: 17.6% and 16.1% respectively) than are the overall averages for the high group.

TABLE 9.D.

ANALYSIS BY RATE OF GROWTH BY TAKEOVER

	1948-64		1964-71	
	Rest	Top 100	Rest	Top 100
Rate of growth by takeover[1]	1.0	14.3	2.1	28.6
Pre-tax rate of profit[2]	17.9	18.4	17.1	21.2
Rate of growth by new investment:[1]				
gross	7.2	11.8	9.4	14.6
net	3.3	7.4	4.0	7.8
Rate of growth of net assets[1]	7.9	21.0	8.9	37.2
Rate of growth by external finance:[1]				
in exchange for subsidiaries	NA	NA	1.1	21.6
for cash	NA	NA	2.0	5.0
total	1.9	12.3	3.1	26.6
Rate of growth by retention[1]	5.4	7.0	5.0	7.7
Opening size (£ million)	2.683	1.029	12.869	6.944
Goodwill as a percentage of closing net assets	2.3	11.0	3.4	13.4
Number of companies	1150	100	866	100

Notes:

All figures are simple averages across all companies within a group.

1. percent of opening net assets.
2. percent of average net assets.

For fuller results see appendix J, Tables J.M. to J.Q.

For fuller definitions see appendix F.

TABLE 9.E.

ANALYSIS BY RATE OF GROWTH BY GROSS NEW INVESTMENT

	1948-64		1964-71	
	Rest	Top 100	Rest	Top 100
Rate of growth by new investment:[1]				
gross	6.4	20.0	8.1	26.0
net	3.0	11.3	3.3	14.5
Pre-tax rate of profit[2]	17.7	20.0	17.0	22.1
Rate of growth by takeover[1]	1.8	5.6	3.9	13.5
Rate of growth of net assets[1]	8.1	18.6	10.1	27.3
Rate of growth by external finance:[1]				
in exchange for subsidiaries	NA	NA	2.5	8.9
for cash	NA	NA	1.9	6.3
total	2.2	9.3	4.4	15.2
Rate of growth by retention[1]	5.3	8.7	4.6	10.6
Opening size (£ million)	2.562	2.420	12.974	6.042
Number of companies	1149	101	866	100

Notes:

All figures are simple averages across all companies within a group.

1. percent of opening net assets.
2. percent of average net assets.

For fuller results, see appendix J, Tables J.R. to J.V.

For fuller definitions see appendix F.

7.7% - see Tables 9.D. and 9.E.). In period 2 the top 100 by new investment matched each percent of growth by retention with roughly 1.5% by external finance; whereas the top 100 by growth through acquisition matched 1% of growth by retention with almost 4% by external finance.[17]

Someone sceptical of the intensive acquirer's success might yet argue that, though its profitability performance was creditable, nevertheless, since assimilation problems limit the feasible rate of growth, these active acquirers could not have had the managerial resources available to administer very fast growth by new investment too. Again, however, the record of the 100 intensive acquirers is in this respect more impressive than that of the rest: their rate of growth by net new investment was roughly double that of the rest. Moreover, it is higher than that of the typical member of the total high group considered in section 9.b., and from which these 100 companies are drawn.

With their superiority in terms of retentions and external funds on the finance side and of acquisitions and new investment on the expenditure side, the intensive acquirers achieved a dramatic total rate of expansion (in period 2 especially). Their average rate of growth

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17. Period 1 reveals smaller differentials. The lower average growth rates and more conservative valuation of issues in exchange for subsidiaries in that period (see appendix D) make for more muted comparisons: but the ranking is still the same.

of net assets was 37% p.a. (see Table 9.D.),[18] which means that the average firm in this category was practically doubling its size every two years.[19] Moreover, this growth rate is an average sustained over seven years.[20] It is 10% p.a. faster than the average growth rate of the top 100 by new investment (see Table 9.E.).[21] [22] The more rapid overall growth rate of those relying heavily on takeover than that of those notable for their internal growth is consistent with the views of the managerial theorists: "except under special circumstances, a greater rate of expansion is made possible by merger (than by internal means)" argues Penrose (1959, p.195), and this position is endorsed by Marris (1964, p.123).

The separation of the most intensive acquirers from the high external growth group provides further interesting results on the role of size. The average opening size of the high group was found to be above average, and considerably greater than that of those making no acquisitions. As Table 9.D. shows, however, those in the high group

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18. All performance ratios were constrained to be no greater than 100% before averages were computed, so the result does not simply depend on a few freak extreme observations. However, the distribution of the top 100 companies by rate of growth by acquisition is positively skewed: see appendix J, Table J.B.

19. Size is admittedly measured in money terms; but inflation of around 6% p.a. which prevailed in this period would not seriously affect this result.

20. And it prompts reservations over Newbould's (1970, p.148) conclusion that the "inability of firms to merge repeatedly is empirically confirmed."

21. The ranking is the same in period 1, but the differences are smaller - partly as a result of the valuation differences discussed in footnote 17.

22. The difficulty of distinguishing between net and replacement investment (see chapter 2) must also be borne in mind in these comparisons. Replacement investment (by definition equal to depreciation) represented about 7% of net assets for the intensive acquirers in period 2, but 11.5% for the top 100 by new investment.

growing most rapidly were much closer in size to the group making no acquisitions. This means, in addition, that the other members of the high group were typically larger than the averages reported in Table 9.A. (the average for these high but not intensive external growth companies was 3.29 in 1948 and 14.73 in 1964): as was the case with profitability they were very similar to the average of the low group. These characteristics of the middling groups (low and the less dynamic high), large size, mediocre profitability and reliance on takeover, accord well with the results of appendix C (that the giants were less profitable than the rest and relied more heavily on growth by takeover).[23] But given the known reliance of the giants on growth by takeover, it is encouraging to find that giantness is not a necessary condition for rapid growth by takeover: some fluidity will be obtained in industrial structure if the small efficient company is able to use the most rapid means of growth to challenge those currently dominating the economy.

d. Summary

While the group growing intensively by acquisition recorded profitability well above average, those with middling growth by takeover (the low group and the high group except for the top 100) were no more profitable than those with zero growth by acquisition. Thus correlations performed on an industry basis revealed weak relationships between profitability and growth by acquisition compared with those between profitability and either total net asset growth or

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23. Moreover, appendix C shows that the Giants display a narrower dispersion of performance than the rest (through time or across companies). One would not therefore expect them to be so highly represented at the extremes of the distribution by rate of growth.

growth by new investment.

The results suggest that above average growth by retentions was not normally a necessary condition for above average overall growth when that growth was secured by takeover. The strong positive association found between growth by new investment, growth by retention, profitability and growth by external finance did not seem to prevail when growth by merger rather than by new investment was pursued. Mediocre growth by retention on the part of companies unremarkable for their profitability must often have been matched by considerable growth by external finance when the finance was raised in share for share exchange during takeover. Moreover, managers and the capital market seem to tolerate much higher matching ratios between external and internal finance when takeover is the principal means of growth than when companies are expanding chiefly by new investment.

While the intensive acquirers also grew by new investment at an above average rate, many of the companies further down the scale of growth rates by acquisition were unremarkable for their growth by new investment: a large minority of companies with high growth by acquisition achieved rates of growth by new investment that were below average.

The average size of members of the different groups provided an interesting comparison with the study of size in appendix C. As in the case of profitability a nonlinearity emerged: the two extremes of the distribution of companies by acquisition rate (zero and intensive) were relatively small; and low or middling growth by acquisition was associated with large initial size.

Chapter 10. Conclusions of Part II.

a. Merger and internal efficiency

For the mergers studied in chapters 7 and 8 post-merger profitability typically showed a decline from the weighted average profitability achieved by the participants prior to merger. For the full set of mergers considered in chapter 7 this result held for all seven post-merger years considered, whether or not outliers were included and whether or not profitability was adjusted for a known accounting bias: only the year of merger itself proved an exception, but this, it was argued, was probably due only to special measurement difficulties in that year. When the experience of particular subsets of these mergers was considered separately in chapter 8, none of the groups' post-merger experience was found to run counter to the typical pattern described in the earlier chapter: the vast majority of post-merger years for all groups distinguished either by degree of diversification or by the relative size of victim and acquirer revealed declines in profitability for the average participants.

Chapter 9 broadened the study of merger and profitability, relating the average rate of profit to the rate of growth by acquisition over a run of years and across all continuing quoted companies. A positive relation was found, but it was much weaker than the relationship between profitability and internal growth. Moreover, it was a rather uneven relationship: the profitability of those with fairly high rates of growth by acquisition was not very different from average, and members of the group with low rates of growth by acquisition were typically less profitable than those with no such growth.

However, those companies enjoying very rapid growth by acquisition (in the top 100 by this variable) were markedly more profitable than average.

Chapter 7 raised the possibility that the set of mergers studied there might not be typical of the population of mergers in the quoted company sector for this period. The criteria for inclusion in chapter 7's study, which were adopted to facilitate comparisons of profitability before and after merger, might, it was argued, debar the more successful acquirers which relied heavily on growth by merger. At first sight the juxtaposed results of chapters 7 and 9 might seem consistent with this suggestion, since chapter 7 found that mergers resulted in profitability declines, and chapter 9 that low or middling growth by merger was associated with mediocre profitability performance, but rapid external growth with profitability appreciably above average. However, the results of chapter 7 do not need to be qualified in this way. In fact the set of acquiring companies examined in chapter 7 was well represented in chapter 9's group of intensive acquirers whose profitability was above average: 38% of the 1964-71 top 100 by external growth were included in the study in chapter 7, compared with 32% of the high but not intensive external growth group, and only 9% of the low external growth group (see appendix K, Table K.A., for full details of the overlap between the populations). Moreover, there need be no inconsistency between the observed <u>decline</u> of profitability (chapter 7) in merging companies and the high <u>level</u> (chapter 9) of profitability (relative to the average) of intensive acquirers. As chapter 7 showed, the typical acquirer enjoyed profitability 23% above the average for its industry-year in the 3 year period prior to merger. The typical decline in profitability after merger (according to chapter 7 again) was of the order of 7% of the level for the industry-year: so post-merger profitability would still be 16% above the average, and the seven-year average profitability level reported in chapter 9 would still appear creditable for the acquirer, even despite the declines attributed above to the merger.

Thus the conclusion of chapter 7 is unamended by the results of chapter 9: there is quite strong evidence to support a presumption that a limited loss of efficiency followed the typical merger. As was argued above, the transition from results for profitability to such efficiency conclusions can be fairly readily made since profit is likely to receive a boost as a result of the enhanced market power of the amalgamation, and any efficiency loss would first have to offset the gains from improved trading terms before being translated into a decline in profitability.

These conclusions for the efficiency consequences of merger are all the more significant because so many other considerations weigh against merger. The enhanced bargaining power of the amalgamation may work against the interests of its trading partners not only through price but also through such features as reduced product range. In addition, the concentration of economic power in ever fewer units, to which merger contributes, is anathema to observers at both ends of the political spectrum: to liberals who cherish the ideal of a private enterprise decentralised economy, and to socialists who fear increases in the power of capital relative to that of labour or that of the state. Perhaps the only argument voiced in favour of merger (apart from the general one of gains in internal efficiency) is the countervailing power suggestion: that, say, a bigger retailer is desirable to hold in check an already big manufacturer. The typical justifications of merger have been variants of the claim that internal efficiency would be increased; and the presumption of government policy that efficiency gains would on the whole materialise, so clearly voiced by Mr. Crosland in 1969,[1] has not yet been displaced. The evidence of this study, together with that of the earlier work reported in appendix H, surely demands that this presumption be abandoned.

b. The incentive to grow by takeover

One account of companies' desire to acquire subsidiaries, even though the amalgamation's profitability has typically suffered as a result, would stress the importance of imperfect information. As Newbould (1970) discovered in his interviews with managers of acquiring companies, little appraisal was generally conducted of the prospective returns to the investment in the subsidiary. It is possible that the acquirers' managements were confident that gains would be realised, and were surprised to discover assimilation problems after merger (which they also admitted to Newbould). In other words, the efficiency losses were a mistake.

Two other accounts of growth at the expense of profitability would

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1. See section 7.b. above: 'In general, mergers are desirable if they lead to better management or genuine economies of scale without eliminating workable competition. In my view more often than not in Britain mergers will fulfil this condition.'

take as their starting-point the divorce of ownership from control emphasised by Berle and Means (1932) and the consequent possibility that conflicts might emerge between the interests of owners and those of managers. Firstly it might be argued that the reduced profitability of the combine was one consequence of a deliberate policy on the part of a satisficing managerial team. The managers' objectives in the merger could be seen as the elimination of competition and the consequent survival of their own organisation even despite reduced efforts on their behalf to maintain sales and efficiency.

The second related account would also see growth by merger at the expense of profitability as deliberate and rational action by managers anxious to maximise their own utility; but this time their interests would be served neither by profitability nor by a "quiet life", but by growth. This would emphasise the rewards which result from growth. Marris (1964, chapter 2) gives a convincing account of the strong pressures on and incentives to managers to increase the size of their companies. Not only does greater size typically bring the directors of a company greater power and prestige; but, other things equal, it also brings more stable performance (see appendix C) and greater immunity from takeover (see Singh (1971)). In addition, it is typically accompanied by higher salaries for directors. Appendix E argues against the majority of earlier studies that the influence of profitability on directors' pay is not trivial; but it is in agreement with earlier work in according a major role to size. Table 10.A., which is derived from the regression estimates of appendix E and the results of chapter 7, provides some orders of magnitude for the effect on directors' pay of the typical changes in size and profitability involved in the mergers studied in chapter 7. The method of, and problems in, predicting pay changes through time from cross section regression estimates are discussed in appendix E; and while the results should not be interpreted too precisely, Table 10.A. suggests that the increase in pay which followed the growth implied by the typical merger studied in chapter 7 would far outweigh the decrease in pay which the regression estimates would predict because of the decline in profitability associated with the merger. If these estimates are to be trusted, the highest paid director would gain a net pay rise of over £1000 p.a. as a result of the typical merger studied in chapter 7. In other words, while the typical merger may well have been to the detriment of the collective shareholders of the victim and acquirer, it would yield appreciable benefits to the acquirers' directors.

To summarise, it is relatively easy to find explanations for growth by merger at the expense of profitability in a world of imperfect information, imperfect markets which leave directors some discretion in the choice of their objectives, and managerial objectives other than profit maximisation.

c. Constraints on growth by takeover, 1: finance

While directors may well be eager to grow by merger even at the expense of profitability, one might expect the level of profitability actually achieved to constrain the rate of growth by acquisition. There are strong theoretical arguments, discussed above in chapter 3 and emphasised by the managerial theorists of the firm, that managers will be reluctant to expand by much more than they can finance from

TABLE 10.A.

THE IMPACT OF THE AVERAGE TAKEOVER ON THE SALARY OF THE HIGHEST PAID DIRECTOR

Averages of the estimates provided in appendix E suggest that a unit difference in the natural log of size[a] was associated with a difference of £4204 in pay;[b] and that a difference of one percentage point in the rate of return was associated with a difference of £89 in pay.

The typical merger reported in chapter 7 represented growth of one third for the acquirer, which corresponds to an increase of 0.285 in the natural log of size.

It produced, according to chapter 7, a decline in profitability of about 7% of the industry-year level. Taking the industry-year level as about 15%, this implies a decline of roughly 1.05 percentage points.

Thus:

Gain on merger = 0.285 x £4204	=	£1198
Loss on merger = 1.05 x £89	=	£ 93
Net gain on merger	=	£1105

Notes:

a. when assets are used as the size measure: see annex to appendix E.
b. when the salary of the highest paid director is used as the measure of pay.

internal sources: the manager's ability to survive the failure of an investment project is believed to fall as the investment - saving ratio rises. Thus a decline in profitability following merger will (other things equal) curtail further growth from retentions. Growth by external finance is also believed to be positively related to profitability: Kaldor (1971) argues that "the amount that can be raised by new issues ... is ... dependent on, and related to, the growth of internal reserves." In the case of issues of fixed interest loan stock this relation may apply because, when future profits are uncertain, managers will be cautious over how much future income to commit to interest payments. Again, in conditions of uncertainty, the capital market may be expected to exert a control over the ratio of equity issues to profits, since current performance may be taken as one of the best guides to future earnings and hence to the attractiveness of new issues: a creditable profit record may be the sine qua non of new equity issues.

These are the reasons generally emphasised for the fairly strong positive relationship between the rate of profit and the rate of growth of net assets which earlier studies have reported and which has been produced again in chapter 9 for the data used in this study. But as chapter 9 also showed, the relationship between profitability and growth by acquisition is by no means as strong as that between profitability and either growth by new investment or overall net asset growth. Moreover, when the top 100 by rate of external growth were compared in chapter 9 with the top 100 by growth by new investment, the intensive acquirers were found to have grown at a much higher overall rate despite a considerably lower rate of growth by retention: the rate at which they matched retentions with new external finance was appreciably higher than that achieved by the top 100 by new investment. Thus in 1964-71 the intensive acquirers managed to grow at five times their rate of growth by retention, while the top 100 by growth by investment grew at some two and a half times their rate of growth by retention. It seems then that the constraint imposed by profitability upon growth may be less effective for growth by acquisition than for growth by new investment.[2]

This observation can be rationalised. It can be argued that the purchase of a going concern involves far smaller risks and uncertainties for the acquiring management than does expansion by new investment: the problems associated with new investment, of using new technologies, entering new markets and challenging competitors whose response cannot be forecast, may be much less severe in the case of takeover. The status quo in the acquirer's and victim's factories and markets need often be little altered as a result of the merger. In the extreme case the acquirer might resemble a financial intermediary, using its own equity to finance shareholdings in various firms, but not intervening in the running of the subsidiary. Growth by takeover would then become akin to portfolio management, and the constraints on the growth of the portfolio much weaker than those on the internal expansion of the individual enterprise within the portfolio.

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2. That the capital market has looked favourably upon acquiring companies is an inference which may also be drawn from the relatively high price-earnings ratio reported for them in the sixties (see the studies reviewed in appendix H).

d. Constraints on growth by takeover, 2: the state

Four generalisations about growth by takeover have been emphasised in this part of the thesis. Firstly, the efficiency gains which in public policy statements have been presumed to be the saving grace of growth by takeover cannot be relied upon: strong evidence was reported of declines in the efficiency of the typical amalgamation after merger (chapters 7 and 8). Secondly, there are strong incentives to managers who have little or no ownership interest in the company to pursue growth by merger even at the expense of profitability (appendix E and above, chapter 10). Thirdly, very high rates of growth are attained through takeover: the fastest rates so attained are higher than those attained by internal means, and the top 100 by external growth were practically doubling their size every two years in the period 1964-71 (chapter 9).[3] Finally, the finance control which has been frequently cited as strongly favouring profitable companies seems to operate much more weakly for growth by takeover: much less reliance is placed on retention finance and many of those growing fairly rapidly by takeover were unremarkable for their profitability (chapter 9).

Any of these four generalisations alone might cause concern that U.K. government policy towards merger has been so permissive; but together they prompt alarm. The onus is surely upon the proponents of growth by merger to demonstrate why government policy should not be reorien-

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3. See also appendix C on the relative gains through takeover of the well established giant companies.

ted with a presumption against takeover. As a second best or interim measure there would appear to be a case for adding efficiency considerations to those used in screening mergers to see whether a reference to the Monopolies Commission is necessary: more detailed scrutiny could perhaps be devoted to prospective mergers where the acquirer's profitability record is less good than average or than the victim's.[4] Not only would such a step inhibit the acquisition of the relatively efficient by inefficient (a match which does not appear to have been very successful from some of the evidence provided above (chapter 8)), but also it would act as a ginger for those companies anxious to grow by takeover. Unlike a blanket hostility towards merger, it would also allow small but dynamic and efficient companies to use this means of growth to challenge the established large companies. But whatever the details of policy changes, the presumption that efficiency gains will more often than not follow merger requires amendment.

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4. True a profitable firm may not necessarily be efficient (it may owe its performance to a strong monopoly position); but a persistently unprofitable company (compared with say the industry average) is surely unlikely to be as efficient as average.

   The inadequacies of conventional historic cost accounting (emphasised in chapter 2 and appendix B) also present difficulties for such a policy. It may be hoped, however, that the Sandilands Committee on Inflation Accounting will soon propose a less imperfect measure of profitability.

   G. Whittington suggested one potential abuse of such a policy: where a bid was uncontested and the actual acquirer was the less profitable, the actual victim might purport to be the acquirer. More careful scrutiny would be required to close this loophole.

One other side effect of a more stringent policy towards merger might be to channel the evident growth aspirations of those currently growing by acquisition into the major alternative form of growth, new investment in fixed assets. It is difficult to demonstrate that, in the past, growth by acquisition has come at the expense of growth by new investment. But the evidence of chapters 7 and 8 does suggest that mergers have often caused assimilation problems which must have absorbed some of the energies of company directors; and that had many of these takeovers been inhibited, managers' ability to pursue growth by new investment would have been enhanced. Not only does this alternative method of growth carry strong possibilities of socially desirable consequences (increased labour productivity, challenge to existing market positions, new products, etc.), but also it appears to be more susceptible to the finance control which allocates the means of expansion to the more successful.

APPENDICES

Appendix A

Subsequent Debate on the Measurement and Taxation of Profits

In the last quarter of 1974, a new debate developed over the appropriate definition of profits for the purposes of taxation and price control: the chief contributions to the debate were those of Merrett and Sykes (1974) and Godley and Wood (1974), and it also prompted a considerable correspondence in the national newspapers. The debate did not, however, produce any arguments or evidence to modify the conclusions of Chapter 2. This Appendix presents an interpretation of the debate in the light of the arguments of that chapter.

The Merrett and Sykes Position

Merrett and Sykes' diagnosis of a profit and liquidity crisis for U.K. companies rests on the assertion that "under inflationary conditions profits must be considered net of both depreciation at replacement cost and of stock appreciation." Indeed, it is because profits have not been so considered that, according to them, the symptoms of the crisis have not been recognised sooner. The profit figures conventionally provided in companies' accounts are based on historic costs: depreciation provisions fail to allow for increases in fixed asset prices with inflation, and the whole of stock appreciation is treated as profit. Such figures are misleading, their argument runs: they claim that both the excess of replacement over historic cost depreciation and also stock appreciation are pre-empted to maintain the firm's fixed and current assets; and hence that these components of profit are available neither for distribution nor for tax payments, even though under present arrangements they are liable to tax. And the record shows that the gap between conventional profits and profits à Merrett and Sykes is a critical one: with the recent acceleration of inflation, though conventional profits rose in aggregate for the U.K. by around 30% in 1973 from their level the year before, profits net of stock appreciation, current cost depreciation, tax and interest fell quite steeply in the same year. Having pointed to accounting conventions as villains of the piece, Merrett and Sykes naturally next prescribe altering them. For the purposes of both tax assessment and price control they advocate a replacement cost basis in place of historic cost: in other words, exempt depreciation at replacement cost and stock appreciation from taxation, and permit companies to pass increases in the costs of their inputs straight on to the customer. The consequences of such a course of treatment would be a drastic reduction in company taxation (assuming unchanged tax rates, as Merrett and Sykes do), accompanied by an appreciable rise in the profit figures that would be recorded on the conventional basis.[1]

This position was directly challenged by Godley and Wood (1974), who issued an outright denial of the very existence of any <u>profits</u> squeeze, and proposed alternative cures for the admitted <u>liquidity</u> squeeze.

<u>The Godley and Wood Case</u>

Godley and Wood reckon they can "demonstrate that one of the central contentions of Merrett and Sykes - that concerning stock apprecia-

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1. These consequences for the company sector in aggregate would be associated with widely varying proportionate decreases in taxation and increases in conventional profit for different companies.

tion - is entirely incorrect." The models they use for this demonstration are reproduced, with some slight modifications and extensions, in Table A.A. Their starting-point is the standard historic cost accounting model; and they assume there is only one asset, stocks, financed entirely with borrowing. The key to model 1 is that in year 1, with inflation then running at 30%, loans at a zero rate of interest are available to finance the whole increase in the value of stocks. The goods bought in year 0 at 100 are sold in year 1 at 130; the 30 difference is available to be paid out in dividends and taxation; whilst the extra 30 necessary to finance replacement stocks is, in the model, provided by the bank.

In flat contradiction of Merrett and Sykes, Godley and Wood's prescription to the government is: don't remit company taxation on stock appreciation, but instead, enable the increase in stocks (in money terms) to be financed through loans to the company sector.

Of course, they are aware that in model 1 the burden of inflation is simply being shifted to the lender. Though he disburses 30 units in year 1, and receives not a penny back, in year 0 prices his claim on the company at the end of the year is exactly the same as at the beginning. Model 2 replaces this clearly implausible assumption of zero interest with a controversial one. In this case the lender does receive some interest - 39 in the example - but the interest is immediately shifted forward to the customer: the value of sales rises by 39 (model 2a). It begins to become clear that, in a Godley and Wood world, profits could never be squeezed: for again (model 2b), raise tax by 20 and the value of sales goes up by 20, leaving a net profit of 20 as in every other case. "We

TABLE A.A.

A. The Godley and Wood Model					B. The Model with Equity Capital	
	Base	Model 1	Model 2a	Model 2b	Model 3a	Model 3b
Year	0	1	1	1	1	1
Rate of price increase	0	.3	.3	.3	.3	.3
a Purchases by companies	100	130	130	130	130	130
b Sales by companies	130	130	169	189	169	175
c Change in value of stocks and work in progress (= change in (a) between one period and the next) = stock appreciation (= change in overdraft (models 1 and 2); = change in equity (model 3)).	0	30	30	30	30	30
d Level of stocks and work in progress (at historic cost) end period (= overdraft (models 1 and 2); = equity (model 3)).	100	130	130	130	130	130
e Accounting profit (on FIFO basis) (= (b) - (a) + (c) - (g)).	30	30	30	50	69	75
f Company tax (one third of (e) except in 2b).	10	10	10	30	23	25
g Interest	0	0	39	39	0	0
h Net profit (= "dividends" in Godley and Wood) (= (e) - (f) in models 1 and 2; = (e) - (f) - (c) in model 3).	20	20	20	20	16	20

Principal assumptions and definitions

Base represents a year of zero inflation preceding the year depicted in the various models.

All models

1. Profits (e) computed using FIFO valuation of stocks.
2. Constant volume of stocks.
3. Goods manufactured in one period are all sold in the subsequent period; this implies (in combination with (1)) that the value of the stocks at the end of the period is equal to the purchases of raw materials and labour in that period.
4. There is no fixed capital, and hence no depreciation.

Model 1 only

5. The rate of interest on bank overdraft is zero.

Models 1 and 2 only

6. Stocks are 100% financed by bank overdraft.

Model 2 only

7. The rate of interest on bank overdraft is equal to the rate of cost inflation.

Model 3 only

8. Stocks are 100% financed by equity capital.

Model 3a only

9. Prices are the same as in model 2a.

Model 3b only

10. Prices are set to yield the same net profit (h) as in model 2a.

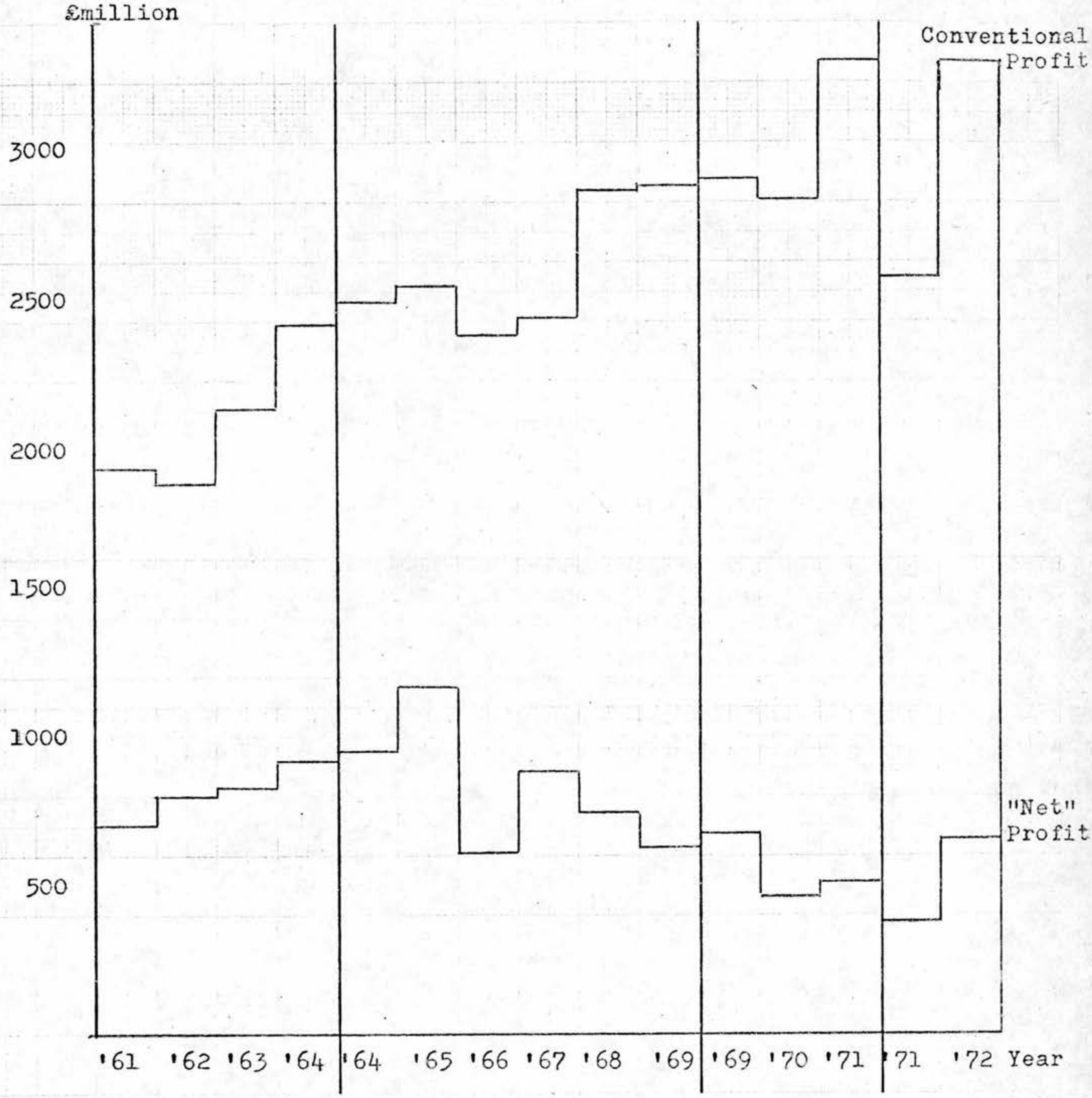
are inclined to believe", they write, "that in the absence of price control, increases or decreases in taxes on profits (and evidently in interest charges) are eventually more or less completely passed on in the form of higher or lower prices."

Only one line of Table A.A. remains unchanged despite variations in other aspects of Godley and Wood's model: net profit (h). This is taken as the datum in their argument: any potential squeeze on it is deflected in full to the lender or the customer. If firms are willing and able to maintain the value of this variable, as Godley and Wood imply, then Merrett and Sykes' diagnosis is wrong: and their prescription of changes in accounting conventions and in the tax base will simply have no effect on company liquidity. Moreover, Day's objection (1974) that Godley and Wood exclude equity capital from their model, making no provision for companies to maintain the real value of their capital intact, is not decisive. Model 3a (my own) in section B of Table A.A. is constructed to work as does model 2a (Godley and Wood's) in Table A.A. except that stocks are financed entirely by equity rather than by loans. It can be seen that in model 3a the value of sales taken for granted in model 2a is almost sufficient, other things being equal, to maintain the real value of equity intact <u>and</u> to yield the same net profit as in the loan financed system. True, it is not quite sufficient, but only because Godley and Wood have unrealistically assumed in model 2 a pre-tax rate of interest equivalent to the rate of inflation, implying a negative real post-tax rate. Had model 2a included a more realistic pre-tax rate of interest, and hence slightly higher prices, Godley and Wood could then have argued against Day that the sales necessary to support at least a zero post-tax real rate of interest would equally meet his requirements for a company financed entirely by equity (maintenance of real capital and net profit intact). Such a situation is represented in model 3b, with sales at 175. But they do not use this argument in replying to their critics - perhaps because it would undermine their own diagnosis of companies' liquidity problems and show their prescription (increased borrowing) to be beside the point: why would companies have any need to borrow if the prices necessary to maintain net profit and to service loans (or to keep their real capital intact (i.e. finance stock replacement)) will always be paid? The crucial issue - assumed away by Godley and Wood - is: have profits been sufficient for both these tasks?

The historical record suggests not. Figure A.A. compares, for U.K. quoted companies, the paths over recent years of conventional profit (after historic cost depreciation and before tax) and of "net" profit (conventional profit less tax, interest, stock appreciation and the difference between current and historic cost depreciation). The former shows an upward trend over the whole period, 1961-72, whilst the latter shows a clear decline since the mid-sixties. The role of inflation in this divergence is discussed in detail above in chapter 2.

Moreover, even if Godley and Wood's analysis were successful at the aggregate level, it would still neglect certain aspects of inflation's uneven impact on the profits of different firms. In their second article ('The Times', 12.11.74) Godley and Wood maintain that "the whole issue of what is the 'proper' basis for assessing taxable profits seems to us to be sub specie aeternitatis, of little import-

FIGURE A.A. Conventional and "Net" Profit of U.K. Quoted Companies, 1961-72



Coverage: U.K. quoted companies in mfg., distbn., etc. (see Appendix F).
Source: Department of Industry (1973).
Note: The coverage of the data changes in 1964, 1969, and 1971: hence 2 values are gi~~x~~en for each of these years, the one comparable with the previuos, the other with the succeeding year.

"Net" Profit is not the accountant's concept of net profit, which is represented here by Conventional Profit, but Godley and Wood's: it comprises dividends and conventional retentions, less stock appreciation and the difference between current and historic cost depreciation.

ance." They see little at stake since for them the level of companies' net profit is a datum, varying neither with accounting conventions, nor with the definition of the tax base. However, the incidence of stock appreciation or the shortfall of historic cost below current cost depreciation (say as a proportion of conventional profit) varies a good deal between different firms and industries: these components form a larger proportion of conventional profit, the more stock- or capital-intensive the firm (see the discussion in section f. of chapter 2 above). It might be, as Godley and Wood claim, that firms are able to pass on in full to the customer the 'cost' of these vehicles of inflation; but when inflation is on the increase, this means that the prices of the more stock- or capital-intensive firms will rise relatively fast. They will presumably pay a penalty of reduced or more slowly growing demand, even if their unit net profits are not squeezed. This bias between firms would clearly be diminished if the tax base were amended to exclude the two elements of conventional profit associated with inflation. Such a change would redistribute taxation from the more to the less stock- and capital-intensive firms, a procedure which could be justified on grounds of equity as restoring the status quo prior to inflation; and it could be accompanied by an increase in the nominal rate of corporation tax in order to keep the total tax bill of the company sector unchanged. However, in their advocacy of changes in the tax base, Merrett and Sykes do also presume that tax rates would <u>not</u> be changed and hence that the company sector's contribution to state revenue would be drastically reduced - a development which for macro-economic balance would have to be accompanied by a reduction in state benefits or an increase in the taxation of other groups. Many observers might readily accept the first set of proposals, on grounds of equity, and yet jib at the large scale redistribution of income involved in the second; and a consensus on the first might more readily be achieved if it were not presented, on Merrett and Sykes lines, as inextricably tied to the second.

Two remaining points in Godley and Wood's critique of Merrett and Sykes received too little attention in the debate. Firstly, they are surely right to suggest that Merrett and Sykes are unreasonable in their assumption that nominal pre-tax profits would be the same after a drastic change in the nominal incidence of the country's tax bill as they would be in the absence of the change. Secondly, they usefully point out that, for given output and distributional objectives, the appropriate government policy response to inflation will differ according to whether the inflation is imported or 'home brewed': the former implies transferring real resources to the foreigner, whilst the latter may imply making no direct change in the resources available to residents, but instead acting to maintain the distribution of income between profits and 'earned' income.

The debate on how to adjust depreciation for inflation was conducted with much less urgency than that on stock appreciation. Perhaps this is because the tax system is already so indulgent in allowing companies accelerated depreciation. Watts points out that "since 1957 at least, the various 'investment incentives' have exceeded replacement cost depreciation." (Letter to the 'Financial Times', 10.10.74). Where real investment in the current year is higher than the average for earlier years (the typical case for post-war Britain), it is easy to see that the 100% depreciation currently allowed by the Inland Revenue on this year's investment is likely to exceed replacement cost depreciation on the total capital stock. This favourable feature of the tax system for companies' cash flow was generally underplayed in the debate (e.g. letter by Lawson to the 'Financial Times', 21.10.74). But a second favourable aspect of depreciation for liquidity has not been mentioned at all. This is the argument developed above (section d. of chapter 2) that if investment is on the increase over time, the replacement cost of those assets actually being retired in the current year (the purchases of many years ago when real investment was smaller than today) will be less than replacement cost depreciation on the whole capital stock (which has increased over time); and that in the late sixties and early seventies for the U.K. quoted company sector, the current replacement cost of retirals (the actual cash needed to buy replacements) would typically be less even than total historic cost depreciation provisions made in any year on a straight line basis (let alone on the accelerated basis allowed for tax purposes). At least until very recently, part of historic cost depreciation has still been available for net investment after financing the replacement of current retirals.[2] [3]

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2. See section d. of chapter 2 on the rising ratio of replacement costs to depreciation with accelerating inflation, and on the vicious circle which develops as inflation rises and the growth of investment slackens.

3. The debate concentrated on the impact of inflation on income measurement, as did chapter 2. Its consequences for asset valuations and rates of return on assets are dealt with to some extent in Appendix B below.

Appendix B

The Development of Accounting with Inflation Adjustments

a. Recent progress

Charged by the professional accounting institutes with producing recommendations on the adjustment of conventional company accounts to reveal the impact of inflation, the Accounting Standards Steering Committee (A.S.S.C.) produced their suggestions in Exposure Draft 8 (E.D.8.) in January 1973. Essentially this proposed that all the transactions recorded in conventional accounts at historic cost be reexpressed, using a general price index in the prices obtaining at the end of the relevant accounting period. These proposals evoked very strong opposition, notably from academic accountants and from investment analysts.[1] Their objections are of two main types: that general index adjustments may give a grossly misleading picture of the experience of the individual firm when the price changes of different classes of goods differ drastically from the movement of the general index; and that certain adjustments proposed imply taking credit for unrealised gains. These objections are further discussed below.

As a result of the disagreement among accountants on how best to proceed with inflation accounting, the government stepped in to set up an independent committee to review the A.S.S.C. proposals, take further evidence on the issue, and recommend which system should be adopted. The Inflation Accounting Committee (I.A.C.) began to take

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1. See, for example, Gynther (1973), Merrett and Sykes (1974) and Society of Investment Analysts (1973).

evidence early in 1974. Pending a decision by the I.A.C., the A.S.S.C. proposed in June 1974[2] that companies should thenceforth provide the additional index-adjusted information detailed in E.D.8. as a supplement to their financial accounts.

Meanwhile, in the budgets of November, 1974 and April, 1975 the Chancellor acknowledged the cash flow difficulties of the company sector (see chapter 2 and Appendix A above), and granted tax relief on the bulk of stock appreciation (of an amount equal to the change in the book value of stocks during the year minus 10% of trading profits: this relief was allowed from 1973-4). These relief provisions are to be reviewed in the light of the I.A.C.'s report, whose brief includes considering "implications (of inflation) for the taxation of the profits and capital gains of companies."[3]

The next section simulates the effect of these 'E.D.8. adjustments' on the past accounts of the quoted company sector, using the aggregates for the whole sector and for individual industries. This has two purposes. Firstly, it gives a foretaste of the new information which will become available as this system of inflation accounting is adopted, giving orders of magnitude for the individual adjustments (identifying the major and the trivial) and relating their size to rates of inflation and to industry circumstances. Secondly, it

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2. Accounting Standards Steering Committee (1974).

3. See terms of reference of Inflation Accounting Committee.

provides a further source of information on the impact of inflation on the income of the company sector in recent years, complementing the discussion above (chapter 2) of inflation's effect on cash flow.

b. The Effect of the E.D.8. Adjustments on Company Accounts

As in (chapter 2) above the basic conventional accounts used throughout are the aggregates for the quoted company sector compiled by the Department of Trade and Industry from the individual accounts of, on average, 1800 companies. All quoted companies engaged in manufacturing, distribution, etc., operating primarily in the U.K., and above a certain size, are included.[4] The adjustments made to these accounts, to approximate the effect of the E.D.8 proposals, are described in detail in the annex, but they may be summarised as follows:[5]

Adjustments to conventional profit:

1. Deduct: the excess of notional depreciation based on estimates of current costs over actual depreciation provisions based on historic cost.
2. Deduct: stock appreciation, the purely inflationary rise in stock values over the year.
3. Add: gains from the erosion of net monetary liabilities (short and long term) by inflation.
4. Add: gains on re-expressing the excess of sales over costs in end of year prices (purchases and sales adjustment).

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4. See below (Appendix F) for details of the population coverage.

5. The estimation method closely follows that used for a small sample of companies by Cutler and Westwick (1973).

Adjustments to asset valuations: re-express in current prices:[6]

1. Fixed assets.

2. Stocks.

All the adjustments proposed in E.D.8. are effected by means of a general price index.[7] The drawbacks of this procedure are well-known: the value of any company's specific assets may diverge widely from historic cost adjusted by a general index. Such adjustments may then provide a grossly misleading impression of that individual company's experience and current situation. This must be a formidable objection to the general introduction of E.D.8. However, it may be said in defence here that the 'general index' adjustments made below are more appropriate for our amalgam of companies than for individual firms: both the aggregate accounts and the price index summarise the experience of individuals in the same broad area, the whole economy. On the other hand, certain crude assumptions are necessary to approximate the effect of E.D.8. on the aggregates, and in retrospect, so that my estimates fall short of the aim of E.D.8.[8] Too precise a meaning should not be attached to the results: they only represent orders of magnitude, even in their limited role as expressions of 'E.D.8. effects', let

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6. Ideally, investments would be upvalued too. But I was unable to do this since I had no way of estimating their date of purchase.

7. As originally prescribed in E.D.8., the Consumer Price Index was used for these calculations, supplemented by the Index of Retail Prices for monthly details. The A.S.S.C. has since recommended the general use of the Index of Retail Prices. This change would not materially alter the results given.

8. The adjustments and assumptions are detailed in the annex.

alone in the broader context of realistic inflation adjustments.

c. Profit Adjustments

The first column of Table B.A. gives the annual rates of inflation used in these calculations. The rate practically doubled between 1961 and 1972; and during the period it ranged from 2.5% to almost 8%. The second column presents the total profit adjustment produced by the detailed adjustments in the subsequent columns. It emerges that the net effect is to reduce the profit figure in every year of the period: the maximum amount of reduction is over 17% (1971).[9] On the whole, the impact of the adjustments has increased over the period, though the increase has by no means been smooth: some years have witnessed quite sharp reversals to the trend.

The individual adjustments which comprise the total do not all show the same pattern over time. Taking depreciation first, the adjustment rises in absolute terms (not shown) in every year but 1962. As a proportion of profit, it sometimes falls when profits rise sharply, but it still rises in every year from 1964 to 1971. Since this adjustment reflects the total inflation between the date of purchase of fixed assets and the balance sheet date (an average of seven years according to the estimates used here), the size of the adjustment has increased with the long term rise in inflation rates,

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9. Chapter 2 argues that the impact of inflation on companies' cash flow has been a good deal more drastic than this estimate of its effect on income: the proportion of profit pre-empted directly and indirectly as a result of stock appreciation reached 35% in the same period (in this case in 1970: see Table 2.B. above).

TABLE B.A.

The effect of the 'E.D.8. adjustments' on the profits of the U.K. quoted company sector: as a percentage of conventional pre-tax profits.

Year	Rate of Infla-tion(1)	Total Adjust-ment	Detailed Adjustments				
			Deprec-iation	Stock Apprec-iation	Loss on Holding Net Mone-tary Assets	Gain from Holding Long Term Liabili-ties	Purchases and Sales
1961	4.0	-9.0	-6.3	-9.4	-1.7	5.7	2.7
1962	2.5	-6.5	-5.8	-2.7	-0.8	3.6	-0.8
1963	2.9	-9.6	-5.6	-7.7	-1.0	4.3	0.4
1964	4.7	-8.2	-5.4	-9.8	-1.6	6.6	2.0
1965	4.1	-11.0	-7.6	-9.9	-1.0	6.0	1.5
1966	3.6	-12.5	-9.6	-10.0	-0.6	6.3	1.4
1967	2.6	-10.3	-9.9	-6.2	-0.5	5.0	1.3
1968	5.9	-11.8	-10.1	-13.5	-1.7	10.4	3.1
1969	4.6	-16.3	-12.7	-13.2	-1.1	8.5	2.2
1970	7.3	-16.0	-16.0	-20.1	0.8	14.5	4.8
1971	6.6	-17.4	-16.1	-18.3	1.2	12.5	3.3
1972	7.9	-12.7	-14.9	-16.9	0.5	13.6	5.0
AVERAGE	4.7	-11.8	-10.0	-11.5	-0.6	8.1	2.2

(1) The percentage increase in the price index between the beginning and the end of the year.

but is not highly sensitive to the current year's inflation rate alone.[10] As against this, in absolute terms, the impact of the other adjustments does vary directly with the current year's rate of inflation. But the effects of the two most significant adjustments, stock appreciation and the erosion of long term liabilities, are opposite in direction; and since they are a similar order of magnitude, they tend to cancel one another out. Taking the adjustments together, the longer term determination of the depreciation adjustment, and the broadly self-cancelling effect of the other adjustments imply only a muted relation between the current inflation rate and the total adjustment. This is borne out by the Table.

d. Asset Valuation

Table B.B. gives estimates of the amount by which fixed assets and stocks would be revalued, following E.D.8., as a percentage of the value recorded under present conventions. The revaluation of stocks is seen to be insignificant: it represents only the inflation in the (estimated) two month average period for which stocks are held. But the revaluation of fixed assets is much more drastic, and increases markedly in importance over the period, the estimate rising to 45% in 1972. This reflects the increasing importance of inflation during the average asset's relatively long life.

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10. The estimated lifetime of fixed assets used here differs considerably from that employed in chapter 2 above. It was emphasised in chapter 2 how difficult it is to estimate asset lifetimes, and the conflicting evidence of Dean (1964) and Shonfield (1965) was reported. Here the estimation procedure of Cutler and Westwick (1973) was followed so that the results were at least consistent with those for their sample of companies. However the warning in section b. above against too precise interpretation of particular results is clearly very appropriate in the case of this adjustment.

TABLE B.B.

The effect of the 'E.D.8. adjustments' on the asset valuations of the U.K. quoted company sector: as a percentage of the conventional valuation.

Year	Fixed Assets	Stocks
1961	21.0	0.5
1962	17.0	0.5
1963	17.0	0.2
1964	17.0	0.5
1965	22.0	0.4
1966	24.0	0.3
1967	25.0	0.6
1968	27.0	1.0
1969	32.0	0.6
1970	38.0	0.7
1971	40.0	0.5
1972	45.0	0.5
AVERAGE	27.1	0.5

e. Rate of Return on Net Assets

These profit and asset adjustments can now be combined to yield a measure of companies' performance, the rate of return on net assets, with and without these allowances for inflation. Table B.C. presents this comparison, and divides the difference between the two measures into a profit effect and an asset effect. Two conclusions emerge. The first is obvious from the earlier calculations: both adjustments always reduce the rate of return. Secondly, unadjusted profitability was on average higher in the second half of the period than in the first half, (13.4% for 1961-6; 13.6% for 1967-72); while by contrast, adjusted profitability fell - from 10.9% for 1961-6 to 9.8% for 1967-72. So the disparity between the two measures was growing sufficiently fast to reverse the slight upward trend of conventional profitability. It follows that economic interpretation of profitability movements in this period will depend crucially on the accounting conventions which underlie the measure used: one measure is not an adequate proxy for the other. In particular, measurement according to E.D.8. precepts again casts doubt on the contention of some observers discussed above (chapter 2) that pre-tax profitability was maintained in the sixties.[11]

f. Individual Industry Experience

A further important aspect of the impact of inflation accounting is whether the effect of the adjustments on different industries and firms would be unequal. Unfortunately, it is precisely in compari-

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11. Panic and Close (1973): "after 1960 there is simply no evidence of a significant decline in the pre-tax profitability of U.K. industry."

TABLE B.C.

The effect of the 'E.D.8. adjustments' on the pre-tax rate of return on net assets of the U.K. quoted company sector.

Year	Pre-tax Rate of Return, Unadjusted	Profit Adjustment	Asset Adjustment	Balance	Pre-tax Rate of Return, Adjusted
1961	13.9	-1.3	-1.5	0.2	11.3
1962	12.6	-0.8	-1.2	0.1	10.7
1963	13.5	-1.3	-1.2	0	11.0
1964	14.4	-1.2	-1.3	0.1	12.0
1965	13.8	-1.5	-1.4	0.1	11.0
1966	12.1	-1.5	-1.4	0.1	9.3
1967	12.0	-1.3	-1.5	0.2	9.4
1968	13.7	-1.6	-1.8	0.2	10.5
1969	13.4	-2.2	-2.0	0.3	9.5
1970	12.8	-2.0	-2.2	0.3	8.9
1971	13.8	-2.4	-2.7	0.5	9.2
1972	16.1	-2.1	-3.4	0.5	11.1

Rate of return = pre-tax profits ÷ average of opening and closing net assets

Profit adjustment = $(P \div A) - (P^* \div A)$

Asset adjustment = $(P \div A) - (P \div A^*)$

Balance = $(P^* \div A^*) - (P \div A)$ - (profit adjustment + asset adjustment)

(This is simply the difference between the sum of the two adjustments applied individually and the total change when both adjustments are applied simultaneously).

Where: P = unadjusted profits
P^* = adjusted profits
A = unadjusted average net assets
A^* = adjusted average net assets

sons of different industries and companies that the shortcomings of E.D.8. become acute. Different areas of the economy and different classes of assets experience widely different rates of price increase: yet E.D.8. abstracts from this variety of rates and uses a single index for all. But as noted above, E.D.8. may be introduced; and in any case, investigating its effect on different industries, even using the inadequate general price index, does show the possible diversity in the adjustments arising for reasons other than different rates of inflation - e.g. different asset and financial structures, and varying proportions of fixed assets and stocks to profits. As indicators of the "true" impact of inflation, the results are, of course, even rougher than my earlier estimates for the aggregates.

Table B.D. details various consequences of the adjustments implied by E.D.8. for the 22 broad industrial groups which form the aggregate considered in earlier sections. The figures relate to 1968 (chosen for convenience in terms of data), when the rate of inflation was almost 6% (moderate by today's standards). The first column shows the total profit adjustment expressed as a proportion of the industries' conventional profits. A fairly systematic pattern emerges: the effect on services (industries 70 to 88) and on many of the consumer goods producers (e.g. 21, 23, 44, 48) is beneficial or less harmful than the average; while setting aside the tiny leather industry (43) the six engineering industries (broadly defined as industries 31 to 39) suffer most.[12] This is chiefly because the latter

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12. In fact, for two of these industries (non-electrical engineering and vehicles) the E.D.8. reduction in profits exceeded their retentions; so that, according to these estimates, they were distributing capital.

tend to have more fixed assets and stocks in relation to their profits than do the 'lighter' industries, so that the stock appreciation and depreciation adjustments bear more heavily on them. A similar story is told when assets too are revalued on the basis of E.D.8.: columns two and three compare the rate of return on net assets of the different industries before and after adjustment. Taking the six 'engineering' industries as a group, and averaging, their adjusted profitability falls below the overall average; they slip further behind after the E.D.8. adjustment. If we compare their rankings according to the rate of return before and after adjustment (column 6 of Table B.D.), it can be seen that they either fall or roughly maintain their ranks at the bottom of the league. In contrast, services and 'light' industry either maintain their lead positions or rise as a result of the E.D.8. reshuffle.

The extent of the reshuffle has important implications for the allocative role of the capital market, a concern of the Inflation Accounting Committee. If the inflation-adjusted accounts are considered to more nearly approximate "real" or "underlying" profitability, and if it is desired that new investment finance should go to the more profitable firms, it could be argued that the introduction of inflation accounting would contribute to the more efficient allocation of finance by the capital market. On the other hand, some would maintain that even this adjusted profitability would be a poor criterion for the allocation of finance; that inflation already erodes a disproportionate amount of the "heavy" industries' internal finance (see chapter 2); and that further discrimination against them by the capital market would, by constraining their investment, have sad

TABLE B.D.

The effect of the 'E.D.8. adjustments' on performance measures of broad industrial groups: 1968.

Industry No.	Industry Name	Adjustment as Percentage of Pre-tax Profits	Unadjusted Pre-tax Rate of Return	Adjusted Pre-tax Rate of Return	Rank by Unadjusted Rate of Return	Rank by Adjusted Rate of Return	Change in Ranking
21	Food	-7.0	13.6	10.7	13	7	+6
23	Drink	1.7	12.5	10.6	18	8	+10
24	Tobacco	-20.7	13.3	10.1	15	12	+3
26	Chemicals and allied	-11.8	13.7	10.2	12	10	+2
31	Metal manufacture	-25.6	11.3	7.2	21	20	+1
33	Non-electrical engineering	-24.0	11.8	7.8	20	19	+1
36	Electrical engineering	-19.2	13.9	10.0	11	14.5	-3.5
37	Shipbuilding and marine engineering	-34.3	7.8	4.2	22	22	0
38	Vehicles	-38.4	12.9	7.0	16.5	21	-4.5
39	Metal goods, n.e.s.	-22.0	15.2	10.1	3	12	-9
41	Textiles	-15.7	14.9	10.5	4	9	-5
43	Leather, leather goods and fur	-35.0	16.7	9.3	2	17.5	-15.5
44	Clothing and footwear	0	13.5	11.3	14	3	+11
46	Bricks, pottery, glass, cement, etc.	-10.9	14.5	9.8	7	5.5	+1.5
47	Timber, furniture, etc.	-12.4	14.6	11.1	5.5	4	+1.5
48	Paper, printing and publishing	-8.2	12.2	9.3	19	17.5	+1.5

Industry No.	Industry Name	Adjustment as Percentage of Pre-tax Profits	Unadjusted Pre-tax Rate of Return	Adjusted Pre-tax Rate of Return	Rank by Unadjusted Rate of Return	Rank by Adjusted Rate of Return	Change in Ranking
49	Other manufacturing	-16.9	14.1	9.8	9.5	16	-6.5
50	Construction	-17.9	14.1	10.1	9.5	12	-2.5
70	Transport and communication (exc. shipping)	-8.2	12.9	10.0	16.5	14.5	+2
81	Wholesale distribution	-14.9	14.6	10.8	5.5	5.5	0
82	Retail distribution	-3.6	18.2	14.7	1	1	0
88	Miscellaneous services	2.6	14.4	12.2	8	2	+6
SIMPLE AVERAGE		-15.9	13.7	9.9			
WEIGHTED AVERAGE		-11.8 (1)	13.7 (2)	10.5 (2)			

(1) Equals whole sector adjustment for 1968: Table B.A.
(2) Equals whole sector figure for 1968: Table B.C.

consequences for the economy in future years. And, in any case, if inflation adjustments impinged more forcefully on managements as a result of inflation accounting, more of the "costs" of inflation might be passed on in price: so the structure of profit rates might itself be changed as a result of the change in the accounting system. Whatever the consequences, it is clear from Table B.D. that the present proposals would produce a substantial and systematic re-ordering of companies within the performance table.

g. Some Implications for Taxation

It was not proposed in E.D.8. that the revised accounts should provide an alternative tax base. However, the case was argued long ago for the use of certain inflation adjustments in arriving at a company's tax base;[13] also the Inflation Accounting Committee's terms of reference raise the question of whether the tax base should be altered from conventional profit; and the Chancellor's relief for stock appreciation establishes a presumption that the definition of profit for tax purposes is going to be changed to take account of inflation. In Table B.E., estimates are given of the proportionate effect on the tax bill of individual industries if 'E.D.8. profit' were used as a tax base. These estimates are based on the assumption that the company sector's total tax bill should remain unchanged (following the I.A.C.'s terms of reference). Since in 1968, as in all years of the study, total 'E.D.8. profit' was less than conventional profit, a higher rate of tax would have to be levied on E.D.8. profit than on conventional profit to yield the same sum of revenue.

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13. J. H. Keeling and G. P. S. MacPherson. Submission to the Royal Commission on the Taxation of Profits and Income, 1952.

According to my estimates, the new rate of Corporation Tax would have to be about 7.5 percentage points higher in 1968 than that paid on conventional profit. As against this, most industries would have smaller taxable profits: an industry with an average proportional E.D.8. adjustment in profits would have an unchanged tax bill; those which did better than average under E.D.8. would pay more, and vice versa.[14] The nature of the results in Table B.E. is implied by the inter-industry comparisons of Table B.D. and of course is subject to the same qualifications: the tax burden would be radically redistributed; the engineering sector would pay around 15% less: light industry and services would often pay more.[15]

h. Conclusions on the Simulation of E.D.8.

Two reservations must be attached to all these estimates. Firstly, the 'general index' approach embodied in E.D.8. is imperfect, especially when applied to individual industries. Secondly, in order to estimate the E.D.8. adjustments retrospectively certain crude assumptions have been necessary: the effect of E.D.8. is only approximated.

Typically, after adjustment, profits appear lower and assets are upvalued. And the size of the adjustments has been rising with inflation over recent years, so that in comparisons of adjusted and unadjusted figures - either in a single year, between years, or across

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14. Details of the adjustments underlying the figures in Table B.E. are given in the annex.

15. Repercussions on profits cannot be ruled out. Those industries which had to pay more tax might raise prices and profits to compensate.

TABLE B.E.

The percentage change in individual industries' tax liabilities if 'E.D.8. adjusted' profit were used as the tax base, and the total liability of the quoted company sector were unchanged: 1968.

Industry No.	Industry Name	Percentage Change in Tax Liability
21	Food	+7.9
23	Drink	+19.4
24	Tobacco	-11.9
26	Chemicals and allied	+2.0
31	Metal manufacture	-16.1
33	Non-electrical engineering	-12.6
36	Electrical engineering	-7.1
37	Shipbuilding and marine engineering	-33.3
38	Vehicles	-34.5
39	Metal goods, n.e.s.	-9.6
41	Textiles	-3.1
43	Leather, leather goods, and fur	-25.0
44	Clothing and footwear	+17.0
46	Bricks, pottery, glass, cement, etc.	+3.0
47	Timber, furniture, etc.	+3.3
48	Paper, printing and publishing	+6.3
49	Other manufacturing	-4.5
50	Construction	-1.4
70	Transport and communication (exc. shipping)	+5.6
81	Wholesale distribution	-1.3
82	Retail distribution	+12.4
88	Miscellaneous services	+20.5
CHANGE IN AGGREGATE LIABILITY		0

industries - conventional profit is becoming an increasingly inadequate proxy for inflation-adjusted profit. It is not likely that this general conclusion would need qualification if specific price adjustments were made.

The results form a complement to chapter 2. For that chapter was devoted to tracing the impact of inflation on managements' ability to finance investment from internal sources. This appendix, on the other hand, gives some impression of the more complicated picture for the measurement of shareholders' income after allowance for inflation. In fact, it appears that cash flow has typically suffered more severely as a result of inflation, than has this measure of income (see footnote 9 above). This is because some of the adjustments proposed in E.D.8. produce increases in income as a result of inflation (for instance gains from the erosion of liabilities fixed in money terms). In general, companies' cash flow position and their inflation-adjusted income position may diverge widely. This will happen especially for companies with high proportions of debt and of stocks in their net assets. Section i. below emphasises these differences when it discusses some consequences of using the income measure proposed in E.D.8. as a proxy for cash flow.

i. Some Issues raised by the A.S.S.C. Adjustment Method

The method proposed by the A.S.S.C. of deriving an inflation-adjusted set of accounts (henceforth 'C.P.P.') has one particular virtue: it employs as a basis the historic information currently used in financial reporting, familiar to practising accountants and readily verifiable with conventional accounting information; only adjustment with a single and easily accessible index is required. As against this, the usefulness of the resulting information is open to question. The recent erratic movements in property and raw material prices illustrate the dangers of using historic cost adjusted with a general index as a proxy for the current (replacement or realisable) value of say the fixed assets or stocks of an individual firm. And yet the specific revaluation of all its assets by each individual firm every year clearly implies both that more resources be devoted to providing information (a cost which would have to be weighed against the benefits of improved decision-making which followed) and that, where a limited market is available for a good, greater subjectivity would enter the valuation. Probably the best that can be hoped for in the short term is a method of index-linked adjustments, but employing a small number of indices for specific product groups, in place of the single index used in C.P.P. Difficulties would still remain, however, in the treatment of some of the major items in the C.P.P. adjustment process, particularly of stock appreciation and the erosion of debt.

Where the prices of a company's stock have risen faster than the rise in a general index, should the excess of the former over the latter be counted as profit? This is a major sticking-poing between the respective proponents of replacement cost and C.P.P. accounting. C.P.P. advocates would argue that this excess represents a real enough holding gain which is retained by the business; and presumably that it should be taxed in the same way as other retentions. Their opponents maintain, however, that this gain can be neither distributed nor used to expand the physical capacity of the business: taxing it actually reduces the funds available for distribution or expansion compared with the situation had the "gain" not arisen.

The suggestion of the National Institute (1974, p.22) seems reasonable on this issue: for a going concern give tax relief on the actual value of stock appreciation (or some approximation to it); but if a company ceases trading and disposes of its stocks, tax any real appreciation (in excess of the rise in a general index).

An analogous situation arises with the erosion of debt. There is a potential gain for a borrower when the value of an asset rises with inflation and the loan with which it is financed is fixed in money terms. Under C.P.P. an estimate of this gain is included in income. However the gain is realised only if the asset is sold and the loan paid off, an event which may never occur for a continuing business. Hence, the adherents of replacement cost would argue, there is likely to be no liquidity gain to management, and the taxation of the potential gain would entail a liquidity loss.

The increasing reliance on debt financing by companies in recent years has meant that their potential gain from debt erosion through inflation has been rising by more than would be expected from the rise in inflation rates alone (see the rise in the importance of debt erosion in relation to other E.D.8. adjustments in Table B.A. above). Consequently, for some companies the deductions from conventional profit made using the E.D.8. method for stock appreciation and inadequate depreciation are for recent years completely offset by the 'E.D.8. gains' from the erosion of debt. This has led some commentators in the financial press (e.g. the Financial Editor in The Times, 11 February 1975) to argue that the implementation of inflation accounting is not a matter of great consequence, since, by and large, conventional profit and inflation-adjusted profit are not greatly dissimilar.[16] However, the distinction between potential and realised gains and losses is crucial here: the "costs" of inflation (particularly the inflated price of replacement stocks) impinge on the company's cash flow in the current year, whereas the "gains" from the erosion of debt may be realised only in the distant future. Neglect of inflation in accounting (especially for tax purposes) on the 'rough justice' argument suggested above is therefore likely to lead to acute liquidity problems.[17]

It is arguable that the importance of gains to companies from debt erosion is part of another major problem in the incidence of taxation in a period of inflation. With the present rates of inflation and of interest, it is clear that part of interest represents compensation to the lender for the erosion of his claim - in other words repayment of the part of capital that inflation will erode. And yet,

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16. This is not to say, as do Godley and Wood, that conventional profits need be no higher under inflation than under constant prices provided that stocks are financed with debt (see Appendix A). As is argued above, their case requires that loans be interest free (or else that interest be passed on in full to the consumer, leaving post-interest income intact). Neither of these conditions has been met in recent years: in fact the companies which have been "benefitting" from debt erosion have often been paying interest rates which have been swollen as the result of inflation; and conventional profits have not risen sufficiently fast to maintain income after the various costs of inflation (see Appendix A).

17. Moreover, even for income purposes, the rough justice argument would only apply for individual firms if each of the gains and losses represented the same proportion of conventional profit for all firms. This is clearly not the case (see section f. above).

under present arrangements, this capital repayment is taxed as income. Indexation of the loan principal, leaving only the real rate of interest to be paid over and taxed would both relieve the drain on company liquidity of high interest rates, and be consistent with a general policy of indexation of capital gains.

These difficulties on both the stock and the debt side are in part instances of the general problem of taxing capital gains in a period of rapid inflation. Though the debate on alternative inflation adjustments for company income draws special attention to it, the same problem keeps cropping up in a whole range of contexts (see, for instance, Flemming and Little (1974), p.6). In his April 1975 Budget Speech, Mr. Healey promised to review the incidence of capital gains tax in the course of the subsequent year. His area of interest does, however, seem rather narrow, centring on whether the capital gains tax "is bearing unduly heavily on those who hold assets for long periods and is too lenient on those who hold for very short periods." Given the importance of the subject both for company financing and for equity, there would perhaps be a case for the Chancellor referring to the Royal Commission on the Distribution of Income and Wealth those aspects of the issue not considered by the Inflation Accounting Committee.

ANNEX TO APPENDIX B.

1. The 'E.D.8. Adjustments'

a. Profit

1. Depreciation

Additional provision for E.D.8. depreciation = conventional depreciation x proportional rise in the price index since the average date of purchase of fixed assets.

Average age of assets estimated as: accumulated depreciation ÷ current year's conventional depreciation provision.

2. Stock appreciation

Stock appreciation = change in book value of stocks - value of physical increase in stocks.

Value of physical increase in stocks = revalued closing stocks - revalued opening stocks.

Revalued closing stocks = book value of closing stocks x (1 + proportional rise in the price index since the average date of purchase of closing stocks).

Revalued opening stocks are defined in the same way as closing stocks. Total months purchases held in stock estimated as: 12 x stocks ÷ year's cost of sales.

3. Erosion of net monetary liabilities

a. Loss on holding net monetary assets = net monetary assets at beginning of year x proportional rise in price index during year +

increase in net monetary assets during year x proportional rise in price index since mid-year.

Net monetary assets = current assets (excluding stock) - current liabilities.

b. Gain from holding long term liabilities is calculated in the same way as the loss on holding net monetary assets. Long term liabilities = preference capital plus loans plus tax equalisation account.

4. Purchases and sales

Gain = gross trading profit x proportionate rise in prace index since mid-year.

b. Assets

1. Fixed assets

Addition to fixed assets = conventional fixed assets x proportional rise in price index since the average date of purchase of fixed assets (see a.1. above).

2. Stocks

E.D.8. stocks = revalued closing stocks (see a.2. above).

2. Special Assumptions

a. Accounting date

The data for any year includes companies with accounting dates between April of that year and March of the following year. Most accounting dates are in fact in December of the year or March of the following year. I have assumed that the 'aggregate accounting date' is December 31st.

b. Age of stocks

The age of stocks calculation requires data on sales, available only from 1969 in the D.T.I. accounts. As the age varied little after 1969, I have assumed that the 1969 estimated age was appropriate for all earlier years (in a.2. and b.2. above).

3. The Estimates of Changes in Individual Industries' Tax Liabilities

The change for each industry has two components:

a. due to the change in the industry's taxable profit;

b. due to the change in the overall rate of tax required to raise the same aggregate tax on changed aggregate profits.

(a) is computed as the marginal rate of tax x the change in the industry's taxable income. The marginal rate of tax is taken as the current rate of Corporation Tax. The change in the industry's taxable income is assumed equal to recorded profit minus 'E.D.8. profit'. This implies for example that capital allowances for tax purposes are inflated by the same amount as companies' own depreciation provisions.

For (b) each industry's adjusted tax bill (i.e. original bill plus adjustment in (a)) is increased by a uniform factor for all industries, so as to yield the same aggregate tax revenue as originally. This factor is calculated as: the original aggregate tax bill ÷

(original aggregate tax bill plus the sum of the individual industry tax bill adjustments made in (a)). In 1968 the sum of adjustments under (a) was negative, so this factor was greater than one.

Note. Only Corporation Tax, and not Schedule F on dividends, is taken into account in these calculations. If, as seems likely, dividends were reduced when inflation accounting was introduced (see footnote 12. above), the yield from Schedule F income tax would be reduced, and the tax rate on adjusted income would have to be yet higher to produce an equal overall yield.

APPENDIX C

The Pattern and Financing of Growth: Giant Companies, 1948-69*

a. Introduction

This appendix forms a complement to chapters 6 and 9 of the thesis: it compares the growth and financing characteristics of giant companies with those of other quoted companies. In their assessment of growth by takeover and the methods by which this growth was financed, those chapters rely on simple averages of ratios across all companies, and largely leave out of account the relative size of the companies belonging to the different groups analysed. This procedure could give a somewhat misleading impression of the importance of certain activities, for instance takeover, to the whole economy because the size distribution of companies is positively skewed. In fact a relatively small number of companies dominate the economy, and increasingly so: in 1969, the top 100 companies accounted for 65% of the total net assets (at book value) of the quoted company population whose aggregate accounts were published by the Department of Trade and Industry. This compares with 50% in 1957 and 46% in 1948.[1]

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*This appendix is the joint work of G. Whittington and myself. An earlier version of it is to be published in The Economic Journal, December 1975.

1. The 1969 figure is overstated somewhat relative to earlier years, since the Department of Trade and Industry excluded certain small quoted companies in 1960, and the 1969 total figure excludes companies above the minimum size requirement which had newly obtained a quotation between 1964 and 1969. See Whittington (1972) for further discussion of these comparisons. For complementary figures on the increase in the share of national net output accounted for by the top 100 and on the associated changes in industrial concentration, see Aaronovitch and Sawyer (1974).

A separate study of the Giants is anyway worthwhile. In the first place, their ascendancy has marked them out for special treatment by recent governments of both Right and Left. The Conservative Government sought to effect price and profit controls by concentrating monitoring efforts on the Giants;[2] and the Labour Party and Government have been anxious to increase public involvement in the policies of the Giants, either through state ownership or through planning agreements.[3] Secondly, much recent theoretical work on the firm has focussed on giant companies, in the belief that they are more emancipated from market constraints on their behaviour, and that for them the divorce of ownership from control has proceeded farthest.[4] Finally, some empirical work has suggested incidentally certain important differences between the Giants and the Rest, in particular in their involvement in mergers (see Singh, (1971)), in the stability of their performance (see Whittington, (1971)), and in their relation with the capital market (see Tew and Henderson, (1959)); although the only specific study of giant British companies (Prais, (1957)) concluded that the similarities between the Giants and the Rest were "more striking than the differences." As is shown below, Prais' conclusion, which related to the period 1948-53, has to be modified for more recent periods, primarily as a result of the high level of merger activity, in which the giant companies have been particularly involved. In fact, the conclusions of chapter 6

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2. See Counter Inflation Act, 1973. Actually, 'category 1' embraced rather more than the top 100 companies.

3. See Labour Party Study Group Report (1973), and White Paper (1974).

4. See, in particular, Marris (1964), Galbraith (1972).

and 9 on the role of growth by takeover are re-emphasised when differences in company size are taken into account.

b. The Subsets of Companies Selected for Study

The population of quoted companies used throughout the thesis (and described in appendix F) has been divided into Giants and the Rest, where a giant company is defined as a member of the top 100 when the population is ranked according to the book value of net assets. Membership of the top 100 is inevitably an arbitrary definition of 'giantness', though it has been popular in earlier work.[5] The length of the period selected prompts a further problem of definition; when both the top 100 membership and the total quoted company population are continually changing, at what point during the period should companies be classified as Giants or the Rest? If the top 100 at the end of the period is separated out, then, firstly, their experience during the period will emphasise the causes of giant status rather than its consequences, and secondly, some members will not even have been alive for the whole period. If the top 100 and the Rest for each individual year are chosen, and their experience averaged over all years of the period, comparisons become confused; the experience of a single company could contribute to the Giant result in some years, to the Rest's in others, and to neither in yet others (if it did not survive the period).

In this study the analysis has been confined to those companies which

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5. For instance, the definition is adopted in studies by Kaplan (1954), Prais (1957) and Channon (1973).

survived[6] the whole period, a procedure which, while eliminating the experience of companies which were born or died during the period of study, does allow the persistent features of a defined population to be isolated, without the confusion of continual changes in the identity of its members. 893 companies survived from 1948-69 and are included in the main analysis (this is the set of companies which constitutes the aggregates in Table 6.A). Then as a criterion for allocating these continuing companies to the two groups, Giants and the Rest, the opening status of the company has been chosen so as to concentrate on the consequences of giant status: members of the top 100 in 1948 which continued in existence to 1969 are compared with those of the Rest in 1948 which were still alive in 1969 (see Table C.A., Section (a) for the numbers within each group).

Of course, by the late sixties, this list of Giants becomes outdated: though all are alive, some will have lost their place in the top 100 and some members of the 1948 Rest will have gained promotion to the ranks of the Giants. To meet this difficulty two further sets of comparisons have been made. Firstly, members of the top 100 in 1964[7] which survived until 1969 are compared with those of the Rest in 1964 who also survived until 1969, this shorter period giving less scope for drastic changes of status (1695 companies -

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6. 'Survival' means continued membership of the population as an independent quoted company.

7. 1964 was chosen because additional information on acquisitions was made available by the D.T.I. from that year (see appendix D).

nearly twice as many - continued in independent existence for this five-year period; see Table C.A., Section (b)). Secondly, the records over the twenty-one years of a group of 'Growing Giants' (which includes many companies which entered the top 100 between 1948 and 1969), and a group of 'Shrinking Giants' (many of which left the top 100 between 1948 and 1969), are compared with the experience of a group of 'Stable Giants' who maintained their status and a stable growth rate for the full period. Both these supplementary studies have some importance in their own right, in addition to that of complementing the basic comparisons for the longer period. The study for 1964-69 focusses on the Giants' experience in the special economic circumstances of recent years, which, as chapter 6 shows, have witnessed very high merger rates; whilst the comparison of Growing, Stable and Shrinking Giants reveals some of the causes of status change and the concomitants of success or failure.[8]

The precise definitions of Growing, Stable and Shrinking Giants introduce some complications. Classification according to the single 'success' criterion of whether a company had moved (up or down) past the arbitrary rank of 100 would produce certain anomalies. To take an extreme example, a company which rose from rank 101 in 1948 to rank 100 in 1969 would be termed a Grower, whilst another firm which jumped from rank 100 to lead the whole field by 1969 would join the more ordinary group, the Stable Giants. Accordingly, additional growth criteria were added to the full definitions of these groups:

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8. Extreme failure would, of course, involve takeover or liquidation, and, therefore, loss of continuity and exclusion from the study.

TABLE C.A.

Number of companies in the various populations studied

1948-1969

(a) Surviving 1948 Giants compared with other Surviving Companies:

Giants (Members of the 1948 top 100)		58
The Rest		835
Total continuing companies (1948-1969)		893

(b) Growing Giants contrasted with Stable and Shrinking Giants:

Growing Giants		
(All of them in the 1969 top 100)		32
Of whom: in the 1948 top 100	4	
in the 1948 Rest	28	
Shrinking Giants		
(All of them in the 1948 top 100)		17
Of whom: in the 1969 top 100	8	
in the 1969 Rest	9	
Stable Giants		
(All in the 1948 top 100, and all but one in the 1969 top 100)		37

1964-1969

(c) Giants (Members of the 1964 top 100)	75
The Rest (Other surviving companies)	1,620
	1,695

Growing Giants: Companies outside the 1948 top 100 which grew into the 1969 top 100, plus companies in the 1948 top 100 which grew[9] at more than twice[10] the rate of money national income from 1948 to 1969. (Most of the former group also grew at more than twice the rate of growth of money national income, and the remainder failed to do so by a narrow margin. All of the latter group were still members of the top 100 in 1969).

Shrinking Giants: Companies in the 1948 top 100 whose growth was slower than that of money national income from 1948 to 1969. (Their shrinkage was thus relative rather than absolute. These companies included all but one of those which were in the 1948 top 100 but not in the 1969 top 100).

Stable Giants: Members of the top 100 in both 1948 and 1969, whose growth rate lay between that of money national income and twice that of money national income for 1948 to 1969. (All but one of these companies were members of the top 100 in 1969; the exception was actually ranked 105 in 1969, having been ranked 93 in 1948).

The numbers in each group are detailed in Table C.A., Section (b).

c. Surviving 1948 and 1964 Giants compared with other Surviving Companies

Table C.B. details the growth of the typical Giant and of the typical

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9. Growth, like size, is measured here in terms of the book value of net assets.

10. This cut-off point has no special economic significance: it was a convenient round number which divided the potential Stable or Growing Giants into two fairly distinct groups of similar size.

member of the Rest (the definitions being based upon opening size) for the two periods (1948-69 and 1964-69). The comparison of rates of growth of net assets reveals that in 1964-69 the Giants grew faster than the Rest,[11] or than both groups for the period 1948-69. As a result, the 1964 Giants had slightly increased their share of joint net assets by 1969.[12] Moreover, the 1964 Giants grew faster on average than the 1948 Giants despite the fact that the average growth rate of money national income was lower in the shorter period.[13]

The section of Table C.B. headed 'Uses of Funds' shows how the relatively high growth rate of the 1964 Giants was achieved. Their growth by new investment in fixed assets[14] was lower than for the

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11. Except in annex Table C.G., "The Giants" or "the Rest" means a typical member of the Giants or of the Rest respectively.

12. Strictly, the change in shares stems from differences in the weighted average growth rates of the two groups. And the differential between the weighted averages was only 0.6% p.a. (in favour of the Giants; see annex Table C.G.) in 1964-69: consequently the Giants' share increased only slightly. In the longer period, although the Rest's simple average growth rate was somewhat below that of the Giants, their weighted average was actually higher, with the result that they increased their share of joint net assets.

13. In comparisons of the growth rate of companies' net assets with that of money national income, the former is probably overstated when the rate of inflation is rising. The denominator in the former case is in the prices of various earlier years, whilst in the latter case, it is in the prices of the previous year.

14. In the summaries of sources and uses of funds in these tables, depreciation has been netted out of both investment in fixed assets and retentions, in order to arrive at the net increase in the value of companies' capital (which corresponds to the growth measure; see chapter 2 above on the arbitrariness of equating depreciation with replacement investment). Similarly, the net increase in all current assets minus all current liabilities is subsumed under "increases in net current assets".

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TABLE C.B.

The anatomy of growth: giants and the rest

	1948-1969		1964-1969	
	'48 Giants	'48 Rest	'64 Giants	'64 Rest
Rate of Growth of Net Assets (% p.a.)	7.8	7.7	10.2	8.0
Shares of Joint Net Assets %				
1948	59.9	40.1		
1964			57.6	42.4
1969	54.8	45.2	58.1	41.9
Rate of Growth of Money National Income[a] (% p.a.)	6.4	6.4	5.7	5.7
Uses of Funds[b] (% of net assets)				
Fixed Assets, Net of Depreciation	3.6	3.2	3.3	3.8
Net Current Assets[c]	1.9	2.2	0.9	0.3
New Subsidiaries and Trade Investments[d]	1.9	2.0	5.4	3.7
Average Interval between Acquisition of Quoted Companies (years)	5	40	2.5	33
Number of Companies within Group:	58	835	75	1620

Notes:

All ratios are unweighted averages across individual company/years.

a. Central Statistical Office (1972) and earlier years.

b. Individual uses sum to slightly less than Rate of Growth of net assets because expenditure on new subsidiaries is shown net of increases in minority interests in subsidiaries.

c. Increases in stocks, debtors and liquid assets, minus increases in trade creditors and provisions, dividend and tax liabilities, bank overdrafts, etc.

d. Valued at book value (in acquirer's books) until 1963; at stock market valuation from 1964 (see appendix D).

For fuller details of the source and definitions see appendix F.

1964 Rest, or for the Giant group during the period 1948-69;[15] but the 1964 Giants markedly surpassed the other groups in their growth by the acquisition of new subsidiaries, a use which had overtaken new investment in fixed assets as the major component of growth and represented more than half of total growth in the typical Giant.[16]

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14. Contd.

Those familiar with company accounts at this time will realise that many companies deducted the value of investment grants from the purchases of fixed assets recorded in their accounts. In standardising these accounts, however, the Department of Trade and Industry was generally able to add back investment grants. The minority of cases where this was not possible on account of inadequate disclosure by companies is not sufficiently large to invalidate any of the conclusions presented here.

In fact, the slight remaining downward bias in reported investment is offset by another measurement bias. The allocation of increases in fixed assets to "new investment" on the one hand, and to the purchase of fixed assets belonging to new subsidiaries on the other, relies on the Department of Trade and Industry being able to identify new subsidiaries and the value of their fixed assets. By default, unidentified fixed assets acquired in a takeover swell the "new investment" figure.

15. The Giants' ability to operate with proportionately fewer net current assets (evidenced here and in the balance sheets which were also available) may simply reflect their membership of industries with relatively small working capital requirements. On the other hand, it may be the result of the Giants' greater efficiency in the management of stocks and of cash balances, or yet again, of their greater market power, which could yield a more favourable creditor-debtor ratio than for the Rest.

Too much significance cannot be attached to the results for net current assets, however; the figure as defined here is essentially a residual comprising all elements of growth in net assets apart from investment and acquisitions. It thus comprises increases in stocks, debtors and liquid assets minus increases in trade creditors, dividend and tax liabilities, bank overdrafts, etc. Greater attention is paid in this appendix to movements in long term investment and financing.

16. A major caveat attaches to detailed comparisons of the acquisitions figures for different periods: they are hindered by a change of definition in 1964. Formerly, acquisitions were recorded at the book value attributed to them in the acquirer's books. From 1964, both the acquisition figure and our definition of net asset growth are based on the cash paid for subsidiaries plus a market valuation of the shares and loans issued in exchange/

The importance of merger activity[17] for Giants in the recent period is supported by a second statistic, the frequency of acquisition of quoted companies: in 1964-69 a typical Giant acquired another quoted company once every two-and-a-half years, whereas members of the 1964 Rest acquired a quoted company only once in thirty-three years.[18] Moreover, as chapter 6 shows, merger activity increased in overall importance for the later period, when both groups were acquiring subsidiaries much more frequently than were their counterparts for the whole period, 1948-69.

The scale of the Giants' reliance on growth through merger provides a striking contrast with the results of an earlier study. In his analysis of the growth of the 320 largest U.K. companies for the period 1954-65, Utton (1972) attributed only around 16% of the growth of the top 80 companies to acquisitions,[19] and found, more-

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16. Contd.

exchange for subsidiaries. Typically, this market valuation exceeds book value (see appendix D).

As was mentioned above (footnote 14), unidentified acquisitions of non-quoted companies swell the other uses headings, depressing the takeover total, and the total is under-stated throughout the period for a second reason: only the purchase price of a subsidiary is included here, not the value of minority interests or of the subsidiaries' long-term loans, which serve to swell the assets over which control is gained, and which are, in fact, included in our definition of growth of net assets. Singh and Whittington (1968, p.213), provides a discussion of consolidation procedures.

17. "Merger" and "takeover" are used interchangeably here.

18. The comparison between Giants and the Rest is not totally fair. Companies typically acquire subsidiaries smaller than themselves (see chapter 7), and the smaller Rest may have acquired non-quoted companies (not included in our analysis) relatively more often, although we have no empirical evidence of this.

19. Utton's lower acquisition figure is all the more striking as he includes in it the minority interests and loan stocks of acquired/

over, "some suggestion of an inverse relationship between size and importance of growth by merger." Two explanations of his lower figure may be invoked. Firstly, and of over-riding importance, Utton's period closes before the merger boom of the late sixties; the figures in Table C.B. relating to the longer period, 1948-69, are much closer to Utton's; and, unless the comparison is upset by differences between the two giant populations, the fact that the 1964-69 average growth by merger exceeded the 1948-69 average implies that the 1948-63 average (which, like Utton's period, excludes the main merger boom) was lower than that for the whole twenty-one years. Secondly, it is possible that Utton's method of allocating growth to external means (mergers) and internal means (all other growth) may overstate the latter at the expense of the former. It is common for acquiring companies to pay more for an acquisition than the "victim's" book value and to deal with the surplus payment either by creating "goodwill" or by revaluing tangible fixed assets (see appendix D). On Utton's definition of internal growth as total growth minus the book value of victims, the figure of internal growth will then incorporate the increase recorded in the valuation of take-over victims. The different period adopted and valuation differences could also contribute to the second discrepancy between our findings and Utton's, over whether there exists an inverse relationship between size and importance of merger.[20] In this context, another factor

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19. Contd.

acquired companies, which are excluded from our definition of acquisitions.

20. Chapter 9 does, however, suggest that companies growing very rapidly by takeover tend to be smaller than average; while companies with middling growth by acquisition are larger than average.

may be the dissimilar range of company size in the two studies: the smaller companies in Utton's sample of the 320 largest are still very big (near Giants) in terms of our sample.

On the financing side, our results for 1964-69 also present an interesting contrast with earlier work, which in this case had prompted a clear expectation that retentions would represent the paramount source of companies' funds. Baumol (1965), in his review of the capital market, concluded that "for the bulk of American enterprise, (the stock market) only constitutes a capital source of last resort", citing the evidence of Donaldson that "only a small minority push the rate of investment to the point of having a need substantially in excess of internal generation over extended periods of time." Kaldor, too, in his recent writings on company taxation (1971), has emphasised the dominant role of internal finance in companies' growth.[21] Similar views have passed into the less technical literature: Galbraith (1972, p.81) for instance, argues that "retained earnings of corporations have become an overwhelmingly important source of capital." Bannock (1973, p.96) maintains that "the mature corporation finances most of its growth from internal sources."

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21. These views were indeed supported by empirical evidence for the early post-war period in the U.K.: see Tew and Henderson (1959, p.70), and Whittington (1971, p.108). It must also be remembered that we have confined our attention to net investment: gross investment is of course financed to an important extent by internally generated depreciation funds (see chapters 2 to 4 above).

The results presented in Table C.C. suggest that the widely held view that internal finance is of paramount importance for large companies may have been correct in the period 1948-64. However, in 1964-69, the giant (or mature) corporations (which account for over half the activity of the quoted company sector - see above) typically financed almost 70% of their net asset growth by new issues; and even the rest of the sector financed more than half (56%) of their net asset growth through the capital market in this period. Just as, on the investment side (Table C.B.), "external growth" by acquisition had in 1964-69 displaced net new investment in fixed assets as the major means of expansion for the Giants, so, on the financing side, long term external funds had overtaken retentions as the principal source of finance.[22] In fact, the two developments are closely related, since, for 1964-69, more than half of these external funds were raised in the course of share for share exchanges on the acquisition of new subsidiaries. The increased importance of external finance as it is defined here, does not, therefore, necessarily mean that the company sector was increasing its reliance on funds from other sectors: the major role of this external finance was in re-allocating control over existing assets among companies, not producing growth of the assets of the company sector (see the discussion of takeover financing in chapters 9 and 10).

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22. This external finance measure, like the acquisition measure in the uses of funds statement, excludes new minority interests and new subsidiaries' existing loans, and might be said to understate new external finance (see footnote 16).

TABLE C.C.

The financing of growth: giants and the rest

	1948-1969		1964-1969	
	'48 Giants	'48 Rest	'64 Giants	'64 Rest
Sources of Funds[a] (% of net assets)				
Retentions	4.2	4.9	2.9	3.4
Issues:				
For Cash	n.a.	n.a.	2.6	2.2
In Exchange for Subsidiaries	n.a.	n.a.	4.0	2.2
Together	3.2	2.4	6.6	4.4
Pre-tax Rate of Return on Net Assets (% p.a.)	14.6	17.2	13.0	15.4
Proportion of Pre-tax Income Retained (%)	24.0	23.7	19.3	20.7

Notes:

See appendix F. for fuller details of the source and definitions.

a. Sources of funds in this Table sum (by definition) to the same amount as Uses of funds in Table C.B. Like the Uses figures, they sum to rather less than total Growth of Net Assets because they omit increases in minority interests in subsidiaries.

The second part of Table C.C., when compared with Table C.B., reveals a further interesting feature of the Giants' financing pattern: the faster growth rate of the Giants in 1964-69 and equality of growth rate with the Rest in 1948-69 were achieved despite a lower rate of profit.[23] Indeed, the 1964 Giants achieved easily the highest growth rate of the four groups, even though they typically recorded the lowest rate of profit (2.4 percentage points below the 1964 Rest), and saved the smallest proportion of that profit; that is, even though the growth rate attained through internal finance was lowest for them. The apparently strange result emerges that the capital market provided the least profitable group, the 1964 Giants, with proportionately more external finance, enabling them to grow faster than the Rest; and this seeming perversity extends to the longer period too, when

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23. Some would argue from the deficiencies of accounting data that these differences in recorded profitability might be accounted for simply by measurement biasses, with the Giants valuing their assets more highly, consequently inflating the denominator of the rate of return, and (through higher depreciation provisions than those of the Rest) depressing its numerator. It seems unlikely in fact that the differentials can be readily explained by the two particular asset valuation biasses commonly adduced. Firstly, the Giants' disclosed rate of return would indeed suffer if they revalued their assets more frequently or more extensively than the Rest. Yet for 1964-69, the period for which such data are available, revaluations represented 6.4% of 1964 net assets for the Rest, compared with only 4.7% for the Giants. Secondly, even without revaluations, inflation can impart a bias, under historic cost accounting, to comparisons of the profitability of companies with different growth rates: the faster growers acquire and so value a bigger proportion of their assets at more recent prices, consequently recording a lower rate of return. However, over the full twenty-one year period, the two groups grew at very similar rates. Then, in 1964-69, the faster growth of the Giants was due to a higher takeover rate, which would probably not impart so strong a bias as a higher new investment rate (and of course, it was the Rest who had the higher rate of growth by new investment): acquisitions are sometimes valued in the acquirer's balance sheet at the victim's historic cost book value and rarely at their full current market value (see appendix D).

the least profitable group, again the Giants, were favoured likewise.[24]

There are, however, some mitigating factors which may help to explain the capital market's favour of the Giants. The Giants' performance displayed less variability than the Rest's in both periods so that compensation for their lower average rate of profit may have been found in lower risk. Table C.D. illustrates this in two ways. Firstly, the average inter-year standard deviation of the rate of return was appreciably smaller for the Giants.[25] Secondly, the Table records the typical interval between years in which a loss is made; and in keeping with Galbraith's dictum that "big corporations almost never lose money"[26] the figures show that the 1964 Giants had a statistical expectation of loss only once every 62 years, compared with once every 16 years for the 1964 Rest[27] - a pattern confirmed by the figures for 1948-69.

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24. Of course, we are dealing with averages here: all the external finance might have passed to the more profitable among the Giants. Nevertheless these results are consistent with the finding of chapter 9 that the relationship between profitability and growth by takeover is much weaker than that between profitability and internal growth.

25. This conclusion holds also for the inter-company dispersion: in every individual year of the two periods, the inter-company standard deviation of the Giants' profitability was smaller than that for the Rest.

26. Galbraith, 1972, p.82.

27. Of course, all the companies studied here are big by some standards: unquoted and smaller quoted companies are not included in the analysis.

TABLE C.D.

The stability of performance, the pattern of financing, and the rate of return on equity assets: giants and the rest

	1948-1969		1964-1969	
	'48 Giants	'48 Rest	'64 Giants	'64 Rest
Average Inter-year Standard Deviation (% p.a.)				
Rate of Return on Net Assets	4.6	8.0	2.1	5.2
Rate of Growth of Net Assets	8.9	11.5	10.2	11.5
Pre-tax Rate of Return on Equity Assets	5.9	9.8	3.0	6.2
Average Interval between Years in which Losses are Made (years)	87	29	62	16
Loan Issues ÷ Total Net Sources (%)	17.0	8.6	35.2	18.2
Loan Issues ÷ Total Issues (%)	44.3	32.7	58.8	50.3
Average Pre-tax Rate of Return on Equity Assets (% p.a.)	16.5	18.6	14.5	16.2

Note:

All ratios are unweighted averages across individual companies.

See appendix F. for fuller details of the source and definitions.

The relative stability of the Giants' performance may make their managements more willing to tolerate a higher level of gearing: as Table C.D. shows, issues of loan stocks accounted for a much higher proportion of sources of finance, and of total issues, for the Giants than for the Rest. As a consequence, their return on equity capital alone may compare more favourably with the Rest than does the return on the total capital at their disposal and this might further mitigate the market's apparent favour of the Giants. To assess the impact of gearing on returns to ordinary shareholders, a measure of the return on equity assets has been obtained by excluding loan interest and preference dividends from the numerator of the rate of return on net assets, and loans and preference capital from the denominator. Whereas for the full twenty-one year period the Rest achieved a return on total capital 2.6 percentage points above that of the Giants (see Table C.C.), Table C.D. shows that the pre-tax rate of return on equity capital of the Rest was only 2.1 percentage points above that of the Giants. For 1964-69 the margin between the two groups' performance was again smaller for the equity return (1.7 percentage points) than for the return on total capital (2.4 percentage points). Thus, the Giants still failed to equal the Rests' return on equity, although the differential was slightly smaller than for the return on net assets as a whole. Since the return on equity assets is the more appropriate measure of shareholders income (though not necessarily of the overall financial success of the firm) the favour accorded the Giants by the capital market seems less than the rates of return on net assets might suggest. Furthermore, the risk attaching to the equity return (as measured by the inter-year standard deviation shown in Table C.D.), is lower for the Giants than for the Rest.

The Giants' higher gearing brings them a further advantage. Since the tax system, and, in particular, the Corporation Tax system which was introduced in 1964, benefits more highly geared companies by exempting loan interest from Corporation Tax, it favours the Giants relative to the Rest; the lower proportion of income paid in tax by the Giants is evident from our data, although the detailed results are not reported here.

d. Growing, Stable and Shrinking Giants[28]

The Growing Giants, by definition, have an outstanding expansion rate; and Table C.E. shows that, like the growth rate of the Giant population studied in the previous section, it owes a great deal to takeover: growth by expenditure on new subsidiaries equalled that by net investment in fixed assets for the Growing Giants, whereas Stable and Shrinking Giants grew by at least two percentage points by the latter means for every percentage point of growth by acquisition.[29] Moreover, the Shrinking Giants had relatively infrequent recourse to acquisition of quoted companies (once every 16 years), whilst both faster growing groups typically took over a quoted company every four years.[30]

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28. This section examines some factors in the diversity of growth experience which contribute to fluidity in the composition of the top 100, a feature documented by Whittington (1972).

29. See earlier discussion of the measurement biasses which cause takeovers to be understated relative to investment in new fixed assets (footnotes 14 and 22).

30. Very likely, the Growing Giants acquired more non-quoted companies than the Stable Giants, particularly in the early years of the period when they were themselves small and would have had difficulty in absorbing the typically larger quoted companies (see footnote 18).

TABLE C.E.

The anatomy and financing of growth: shrinking, stable and growing giants, 1948-69

	Shrinking	Stable	Growing
Rate of Growth of Net Assets (% p.a.)	4.1	8.7	16.6
Rate of Growth of Money National Income[a]	6.4	6.4	6.4
Uses of Funds (% of Net Assets)			
Fixed Assets, Net of Depreciation	2.4	4.0	5.9
New Subsidiaries and Trade Investments[b]	0.8	1.9	5.9
Net Current Assets[c]	0.9	2.3	3.8
Average Interval between Acquisition of Quoted Companies (years)	16	4	4
Pre-tax Rate of Return on Net Assets (% p.a.)	11.7	15.9	18.0
Proportion of Pre-tax Income Retained (%)	23.8	24.5	26.6
Sources of Funds (% of Net Assets)			
Retentions	2.8	4.8	6.8
Issues	1.3	3.4	8.9
Number of Companies within Group:	17	37	32

Notes:

a. Central Statistical Office (1972) and earlier years.

b. Valued at book value (in acquirer's books) until 1963; at stock market valuation from 1964 (see appendix D).

c. Increases in stocks, debtors and liquid assets, minus increases in trade creditors and provisions, dividend and tax liabilities, bank overdrafts, etc.

For fuller details of the source and definitions see appendix F. Ratios are unweighted averages across individual companies.

Sources and Uses of Funds sometimes fail to sum to the rate of growth of net assets because changes in minority interests in subsidiary companies, which are a component of net assets, are omitted from Sources, as presented here, and deducted in calculating the Use of Funds "New Subsidiaries, etc."

However, whereas in the comparison of the Giants with the Rest, the former typically grew faster even despite lower profitability, here profitability is positively associated with growth, and the proportion of profits retained is also least for the Shrinking Giants and greatest for the Growing Giants. Nevertheless, on the financing side, it is differences in the receipt of external finance which chiefly account for the differences in growth rate.[31] Each percentage point of growth from internal funds was matched by 0.46 percentage points' growth by long term external finance for the Shrinking Giants, 0.70 for the Stable Giants, and 1.31 percentage points for the Growing Giants.[32] For the Growing Giants then, capital issues were of major importance; and whilst information is not available for this period on the proportion of external finance raised in share exchange during takeover, it is probable, in view of the importance of takeover to the Growing Giants and of the role of share exchange for the typical Giant in 1964-69 (revealed above), that merger financed through share exchange was a very significant factor in the Growing Giants' development.

Table C.F. summarises these factors in the growth disparities. The differences between the three groups' average rates of net investment in fixed assets exceeded those for profitability, but the differences for total net asset growth were greater still, thanks to the

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31. These conclusions echo those for the study in chapter 9 of companies which grew intensively by acquisition.

32. Again, external finance may well be understated because of measurement factors (see Footnote 22).

greater external financing associated with the drastically greater differences in the rate of growth by acquisition.

e. Summary

(a) Characteristics of the Typical Giant:

1. It typically grew appreciably faster than its counterpart in the Rest in 1964-69, but not in 1948-69. A greater proportion of its expenditure was devoted to takeovers than was the case for the Rest; and, indeed, in 1964-69, the typical Giant spent more on takeovers than on net new investment in fixed assets. This reinforces the conclusions of chapter 6 on the importance of takeover to the typical company.

2. In both periods, its pre-tax rate of return on net assets was roughly two-and-a-half percentage points below that of the Rest. As the proportion of pre-tax income retained was, however, similar for both groups, the growth rate the typical Giant was permitted by the supply of internal finance fell short of that permitted for the typical member of the Rest. Necessarily, therefore, its higher growth rate was achieved by greater reliance on the capital market: in 1964-69, the capital market in fact supplied roughly 70% of the growth of the Giant's long term finance as against 56% for the Rest. The Giant's greater reliance on external finance in 1964-69 compared with the Rest and also with the earlier period is associated with its high rate of takeover; more than half of its new issues were made in exchange for new subsidiaries, a procedure which, of course, involves no inflow of funds from other sectors, but only a re-allocation among managements of control over existing assets. These results are consistent with those of chapter 9 that profitability is relatively weakly associated with growth by takeover.

TABLE C.F.

Summary of relative performance: shrinking, stable and growing giants, 1948-1969

	Shrinking	Stable	Growing
Stable Giants = 100			
Pre-tax Rate of Return	74	100	113
Net Investment in Fixed Assets ÷ Opening Assets	60	100	147
Rate of Growth of Net Assets	47	100	191
New Subsidiaries and Trade Investments ÷ Opening Net Assets	42	100	311

Note:

For details of definition, see Table C.E.

3. Two factors may explain why the capital market supplied relatively more external finance to the less profitable group, the Giants. Firstly, less risk may attach to ownership of the Giant's shares; its performance was more stable over time, and it lost money less often. Secondly, the typical Giant enjoyed a higher level of gearing (which perhaps was fostered by its more stable performance and was certainly encouraged by the tax system) with the result that its average rate of return on equity capital showed it in a slightly less unfavourable light than did the average rate of return on net assets.

(b) The Rise and Fall of Giant Companies:

The study of Growing, Stable and Shrinking Giants re-emphasises the importance of growth by merger, financed through share for share exchange. For the Growing Giants, the acquisition of new subsidiaries typically accounted for a higher proportion of expenditure than did the purchase of new fixed assets. Though the Growing Giants were typically the most profitable of the three groups, and saved the biggest proportion of their income (with the Shrinking Giants displaying the lowest profitability and the lowest retention ratio), so that their internal sources permitted a higher growth rate, yet it was differences in the ratio of new issues to retentions which chiefly accounted for the disparities in growth rates.

It seems likely that much of the Growing Giants' greater external finance was raised by share for share exchange in the course of their frequent takeovers.

ANNEX TO APPENDIX C.

1. The Choice of Summary Statistics

The earlier work of Prais (1957) was based on a comparison of aggregate accounts summed over a five-year period and across all companies within two groups, Giants and the Rest. For the twenty-one year period considered here, however, such a procedure would involve giving the later years much greater weight than the earlier ones, as the unit of measurement, money, declined in value throughout the period.[33] To remedy this problem, performance variables (profitability, growth, investment, etc.), have been computed in ratio form for each company-year and averaged for each group-period;[34] [35] whilst flow accounts have been computed in percentage form for each company over each of three seven-year sub-periods,[36] and the arithmetic averages of these sub-period results have then been computed for each group. This gives equal weight to each sub-period, although the later years within each sub-period are still likely to have high weight relative to earlier years.[37]

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33. Prices typically doubled during the period: see Central Statistical Office (1972), Table 16.

34. This is the same procedure as is adopted in chapters 6 and 9. In all cases, extreme individual ratios (above 99.9% or below -99.9%) have been constrained (to 99.9% or -99.9% respectively), when computing summary statistics for a group.

35. Growth rates were also calculated on a geometric basis for each firm across each period. The average of the geometric growth rates yielded similar results to the arithmetic company/year average. The latter is preferred in the main text because of its convenient property as the sum of individual Sources or Uses, and because of its advantages in offsetting the effects of inflation in eroding the weight of growth achieved early in a period.

36. One five-year period in the case of the 1964-69 study.

37. A preferred procedure would have been to compute and average percentage flow accounts for each company-year; and this was, in fact/

Averaging the experience of individual companies within a group gives equal weight to each firm, irrespective of size, and gives a picture of the "typical" company which would be masked by the influence of a few large companies in a weighted average. For, even with the Giants separated from the Rest, the diversity of size within each group is still extremely large: in 1969 the biggest company was roughly 40 times the size of the company ranked one-hundredth in size, which was itself, about 40 times that of the smallest companies considered. Consequently, the experience of smaller companies within either group would have relatively little weight in crude aggregates or weighted averages for the group. The main analysis, then, is based on simple averages of ratios, representing the typical behaviour of members of a group, though certain weighted averages are reported in Table C.G.[38]

2. Industry Growth and Diversification

This section of the annex presents some limited and speculative conclusions on the association between the industry environment of Giant companies and their growth. The members of the three groups, Growing, Stable and Shrinking Giants, were classified by their 1948 two-digit industries; and the 22 industries represented were themselves

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37. Contd.

fact, attempted. However, the volatility of income meant that the denominator of these annual accounts, profit or total sources of funds, was often very small or negative. This led to many enormous and/or negative values for individual percentage flows, which would have had to be excluded from the analysis if they were not to distort the averages. When the percentage flows were computed for a longer period, however, very few companies had to be excluded for this reason.

38. The comparison of a weighted average with an arithmetic average across firms gives some indication of the way in which a variable is affected by size of firm within a group.

TABLE C.G.

Weighted averages of the main performance variables compared with unweighted averages

	% p.a.			
	Pre-tax Rate of Return on Net Assets		Rate of Growth of Net Assets	
	Weighted	Unweighted	Weighted	Unweighted
Giants 1948-69 (58)	14.1	14.6	8.9	7.8
Rest 1948-69 (835)	15.3	17.2	10.3	7.7
Giants 1964-69 (75)	13.1	13.0	9.9	10.2
Rest 1964-69 (1618)	14.2	15.4	9.3	8.0
Growers 1948-69 (32)	14.5	18.0	16.0	16.6
Stable Giants 1948-69 (37)	14.7	15.9	9.3	8.7
Shrinkers 1948-69 (17)	12.4	11.7	5.0	4.1

Notes:

The weighted variables are computed from group annual aggregates using the definitions provided in Singh and Whittington, 1968, p.236. Figures in brackets are numbers of companies within the relevant group. The unweighted variables are extracted from Tables C.B., C.C., and C.E.

ranked by their average rate of growth of net output for the twenty-one year period.[39] Taking each group in turn, the proportion of companies which belonged to the 11 faster-growing industries was calculated with the following results:

Percentage of the -

Shrinking Giants in the faster-growing industries	...	53
Stable Giants " " " " "	...	51
Growing Giants " " " " "	...	66

Whilst, according to this very crude indicator, Shrinking Giants appear on average to have enjoyed at least as favourable an industry environment as the Stable Giants, the Growing Giants did typically "benefit" from membership of faster-growing industries from the first.[40]

Some information has also been extracted on the attempts by Shrinking, Stable and Growing Giants to change their industrial base. As a proportion of their total acquisitions of quoted companies, take-overs of companies outside their own two-digit industrial classification amounted to:

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39. Central Statistical Office (1972) and earlier years.

40. This implicitly assumes that causation runs from industry to company. The reverse may sometimes be true: for instance, even if the company could take the growth of home demand for the industry's output as given, the company's export performance could still significantly affect its industry's growth of home output.

	% by number	% by value
Shrinking Giants	48	53
Stable Giants	53	58
Growing Giants	34	21

Of course, this study gives a very incomplete picture, since it is based on crude industry classifications and also excludes both acquisitions of non-quoted companies and diversification by direct investment. Nevertheless, it complements the information on industry growth, showing that the differences in this diversification rate[41] between Shrinking and Stable Giants were relatively slight, whilst Growing Giants devoted a much smaller proportion of their takeover activity to diversified mergers.[42] This supports the suggestion that the Growing Giants found their initial industry environment relatively favourable to their expansion.

41. Of course, the typical Growing Giant spent much more on acquisitions, in relation to its size, than did the member of the Stable or Shrinking Giants (see Table C.F.); and consequently its "rate of growth by diversified acquisition" would still be higher.

42. Gort (1966) found evidence for the United States that in the majority of cases, companies diversified into industries which enjoyed a faster rate of growth than their own original industries.

APPENDIX D

The Valuation of Acquired Companies, and its Impact on Profitability

a. Introduction

In a regime of rising prices, the book value of companies' assets (which for the most part represents their historic cost) typically understates their realisable value. When a company is taken over, the acquirer often pays more than the book value of the victim, and sometimes enters the victim in its own books at a value exceeding that in the victim's books prior to the merger. This excess will normally be entered in the acquirer's balance sheet under the asset heading 'goodwill'; the victim's assets will then be added to the other components of the balance sheet at historic cost. In these cases of revaluation, the rate of return of the amalgamation (profit ÷ average book value of net assets) will be lower than the weighted average rate of return for the two separate entities would have been in the absence of merger: for a bigger denominator (incorporating goodwill) is used in calculating profitability.[1]

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1. A further bias exists in the calculation of the rate of return for an amalgamation in the year of takeover.

   If we assume that the takeover typically occurs in the middle of the financial year, then the actual rate of return of the amalgamation will be computed as:

$$R_{my} = \frac{U_{by} + \frac{1}{2}U_{vy}}{\frac{1}{2}(D_{by-1} + D_{by} + D_{vy})}$$

   where y = year of takeover
   b = acquirer
   v = victim
   U = profit
   D = net assets

   The weighted average profitability of the acquirer and victim, had they not merged, would, however, be:

   R'_{my}/

Although accounting conventions prompt a clear expectation of a bias in any profitability results (one which would in fact weaken if not reverse the typical conclusions of earlier work) only Singh's study makes allowance for it. He dismisses it, however, as slight, and insufficient to seriously modify his results. Nevertheless, inflation has continued apace since Singh's period of study (the late fifties), and it seems likely that premia over book value will have been increasing.

b. <u>The available data on merger valuation, and the estimation of goodwill arising on consolidation</u>

Three values of a new subsidiary may be distinguished (although two or even all three may in some cases be identical):

V.1: the valuation attributed by the Department of Industry (D.I.).

V.2: the amount at which the acquisition is recorded in the acquirer's balance sheet.

V.3: the value of the victim in its own balance sheet, prior to acquisition.

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1. <u>Contd.</u>

$$R'_{my} = \frac{U_{by} + U_{vy}}{\frac{1}{2}(D_{by-1} + D_{by} + D_{vy-1} + D_{vy})}$$

If the victim's and the acquirer's profitability are identical and if $D_{vy} > D_{vy-1}$, then $R < R'$.

Of course D_{vy} <u>will</u> normally exceed D_{vy-1}, since the growth of net assets by retentions is generally positive. Fortunately, however, the bias on this account is only likely to be slight on average, insufficient to modify the results. For instance (substituting typical values), suppose that the victim is one-fifth the size of the acquirer; that one-fifth of profit is retained; and that the rate of return on net assets is around 15%. Then R will fall short of R' by about 0.02%. But where the acquisition takes place late in the year, and victim net assets grow by more than average the difference will be larger, and vice versa (see the discussion in chapter 7 of profitability in the year of merger).

Before 1964, V.1, the D.I.'s valuation in the flow of funds statement was taken as V.2. From 1964, however, the D.I. provided, wherever possible, a current valuation of the newly acquired subsidiary, defined as:

"... the cash paid or the market price at the date of issue of shares or loan stock issued ... Where market values are not available (not generally the case for the quoted companies dealt with here) or the cash consideration is not disclosed (sometimes it would be difficult to infer this value from companies' accounts before the 1967 Companies' Act, which required more detailed disclosure of changes in assets and reserves) acquisitions are in general valued at the net book value of the acquired company."[2]

However, there is no statutory requirement of companies that they disclose the market value of the shares and stocks which they issue in exchange for new subsidiaries (in fact, company reporting of acquisitions leaves much to be desired: often neither V.1 nor V.2 nor V.3 is detailed in companies' accounts - see Lee (1974)). The D.I. obtains this information from the Stock Exchange Weekly Intelligence and from the financial press. V.1 appears in the Data Bank at T73 (consideration for subsidiaries) from 1964; and this is the valuation used (along with information on trade investments, etc.) at T39 (expenditure on subsidiaries and trade investments) in the Uses of Funds Statement (see appendix F). Hence it is the measure used, from 1964, in the net assets growth measure employed elsewhere in the thesis.[3]

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2. Department of Industry (1975).

3. See chapter 9 and appendix C in particular.

The D.I. have typically provided V.3 in the computer file of company accounts, but only since 1964. This information appears at T78 to T87 and T90 (composition of subsidiaries' assets) in the Data Bank, where the D.I. analyse the accounts of the victim prior to acquisition (this analysis of the subsidiary's net assets into its component asset headings also enables the D.I. to exclude from uses of funds headings, such as investment in fixed assets, the change in the balance sheet heading, fixed assets, due simply to the takeover, and not representing purchases of new fixed assets). However, the D.I. does not perform this analysis for all acquisitions: only an assumed total book value is provided where the purchase consideration (V.1) is less than £0.9 million or the victim is a foreign registered or private exempt company. Since the threshold is defined in terms of market value, however, victims with a book value of much less than £0.9 million are often analysed by the D.I. (N.B. mergers with quoted victims whose accounts have not been analysed by the D.I. are still included in the sample studied in chapters 7 and 8: these exclusions apply only to the valuation study reported below). Nevertheless, increases in asset headings in the uses of funds statement will be distorted when a company acquires another which does not fall within the categories for analysis: increases in assets will include the stocks of assets purchased with the new

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3. Contd.

V.2 represents the actual change in the acquirer's net assets; but it is arguable that V.1, being based on current values, is more consistent with other components of net asset growth, such as investment in new fixed assets which are measured in current values. Problems do arise in comparing V.1 between individual years, however: it is a volatile measure moving with the often violently fluctuating level of stock market prices.

subsidiary, and, since the purchase price also appears as a use of funds at T39, a balancing adjustment appears under T44, the consolidation adjustment. This problem will often be trivial in the case of very big acquiring companies, but could be more serious for smaller ones.[4]

In the years since 1964, the period of the merger study, V.2 is not provided separately in the D.I.'s computer record, and hence not in the Data Bank either. Yet this is the critical value for assessing the accounting bias in post-merger profitability, since the difference between V.2 and V.3 is the distorting element in the profitability calculation, goodwill. A procedure has therefore been developed for estimating the goodwill arising on consolidation in order that allowance can be made for its effect on post-merger profitability.

This component of goodwill (G) is estimated as:

$$G = T15_{ay} - T15_{ay-1} - T38_{ay} - T80_{ay} \qquad \text{(D.i)}$$

Where:

a: acquirer

t: year of acquisition

T15: goodwill per balance sheet

T38: increase in intangible assets per uses of funds statement

(i.e. purchases of intangible assets other than goodwill on acquisi-

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4. This information on valuations has been obtained from the D.I.'s duplicated instructions prepared for the Department's staff responsible for the analysis and standardisation of the accounts in our Data Bank; and from discussions with the Department's staff, Mrs. W. R. Borland and Mr. P. G. Reeve.

tion).

T80: goodwill in the accounts of the victim company at the time of takeover.

Lest this estimation procedure might produce extreme and inappropriate results because of odd treatments of goodwill by individual companies or D.I. analysts, the absolute value of G was constrained to be no greater than the absolute value of (V.1 - V.3). It is possible that V.2 sometimes actually exceeded V.1, with the result that this estimate of G would be biased downwards; but given the accounting profession's predisposition to conservative valuation, it did not seem likely that the acquirer's book valuation of a subsidiary would exceed the market value too frequently, or by too much. Given the possibility of unforeseen and unwarranted extreme results if the constraint were not applied, the expedient seemed justifiable.

Profitability adjusted for the accounting bias on acquisition (F in chapter 7) was then defined as:

$$F_y = \frac{2.U_y}{D_y + D_{y-1} - G} \qquad \text{(D.ii)}$$

$$F_{y+1} = \frac{2.U_{y+1}}{D_{y+1} + D_y - 2G} \qquad \text{(D.iii)}$$

$$F_{y+2} = \frac{2.U_{y+2}}{D_{y+2} + D_{y+1} - 2G} \qquad \text{(D.iv)}$$

... etc.

Where U = profit (T66 - T32 - T33 - T34 + T59)

D = net assets (T22).

(See appendix F for definitions of variables in the 'T' sequence). Except that, if a company wrote off goodwill in a year succeeding the acquisition, and the total which was written off exceeded G, then it was assumed that it was the goodwill arising on consolidation which had been written off; and G rather than 2G was deducted from the denominator for the year of write-off with no goodwill deduction in subsequent years.

c. Comparison of adjusted with unadjusted profitability: an example

Table D.A. illustrates the potential scale of the accounting bias by comparing profitability according to the usual definition ($2U_y/(D_y + D_{y-1})$) with F for the acquirer in a famous takeover of the late sixties, G.E.C.'s purchase of A.E.I. Profitability after allowance for the accounting bias is around a sixth higher than the conventional measure in the year of acquisition, and about a third higher in subsequent years. Consequently, if adjusted profitability (F) after the takeover were as high or even marginally higher than that achieved on average by the two companies prior to the takeover, tests based on the conventional measure of profitability alone (R) would reveal a marked decline in this performance indicator for G.E.C.

d. The typical extent of the accounting bias

To see whether G.E.C.'s experience was typical, or whether the accounting bias was by and large slight, the premia over book value and their effect on the conventional profitability measure were estimated for all acquisitions of quoted companies analysed by the

TABLE D.A.

Profitability according to the standard measure and profitability adjusted for the accounting bias: G.E.C. in 1968

Principally as a result of the takeover of A.E.I., goodwill on consolidation of some £170 million was added to the net assets of G.E.C. in 1968, apart from the addition of the net assets of the new subsidiaries at historic cost.

According to the estimation procedure detailed above,

G = £170.6m[a]

This figure was used to obtain an adjusted profitability figure for 1968 and subsequent years using (D.ii, D.iii, etc.).

%	R	F
1968	12.9	15.6
1969	10.2	13.7
1970	10.5	13.9
1971	12.2	16.0

[a]The goodwill figure given by Lee (1974) for the takeover of A.E.I. alone which was obtained from a detailed examination of the company's accounts was £ £167.1m. The small difference is probably due to goodwill arising on the other two minor acquisitions by G.E.C. in the same year.

D.I. between 1964 and 1971.[5]

Table D.B. illustrates the relationship between the three valuation methods outlined above (V.1, the D.I. valuation (market in this period); V.2, the valuation in the acquirer's books; and V.3, the valuation in the victim's books). Goodwill arising on consolidation (V.2 - V.3) and the excess of market over victim's book value (V.1 - V.3) are expressed as percentages of the victim's book value. Though they are provided for reference, the relationships between the aggregate (all acquisitions) values of these variables are not the most useful in assessing the likely impact of the valuation bias on profitability: they depend to a great extent on the accounting treatment of a small number of takeovers which dominate the aggregates (the size distribution of companies, and hence of takeover victims exhibiting high positive skewness). The studies of takeover's influence on profitability, reported above, give each company equal weight: so it is appropriate here to calculate the ratio of goodwill and market premium to book value for each individual acquiring firm, and then take simple averages of these values across companies. The resulting statistics are provided in the final columns of Table D.B.

The premium of market over book value is considerable, of the order of one to two thirds of book value. Moreover, being very sensitive to the general level of stock market prices, it fluctuates considerably between years. This illustrates the shortcomings of this measure as a guide to year to year changes in the volume of takeover

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5. See the D.I.'s criteria for analysing takeovers, discussed above.

TABLE D.B.

Alternative valuations of new subsidiaries

	Book value of victims in their own books, prior to acquisition B^a £ million	Goodwill arising on consolidation G^b £ million	Excess of D.I.'s valuation over book value P^c £ million	G÷B %	P÷B %	Average of individual values of (G/B) for each acquirer g %	Average of individual values of (P/B) for each acquirer p %
1964 (60)	387.1	87.8[d]	60.9	22.7	15.7	36.4	46.6
1965 (70)	362.0	16.5	35.6	4.6	9.8	31.7	58.3
1966 (55)	315.0	44.6	46.5	14.2	14.8	31.8	37.9
1967 (68)	729.5	38.2[d]	31.5	5.2	4.3	21.4	30.6
1968 (120)	1055.2	205.8	584.4	19.5	55.4	34.0	68.4
1969 (91)	612.2	125.8	204.9	20.6	33.5	30.8	67.3
1970 (86)	553.3	52.5	77.1	9.5	13.9	31.4	45.7
1971 (46)	526.2	113.0	249.0	21.5	47.3	34.9	73.6

Notes

The number of acquirers contributing to the total is given in brackets under the year.

The sum of B and P falls short of the aggregate expenditure by quoted companies on acquisitions detailed in Department of Industry (1975). This is because acquirers which bought small subsidiaries whose accounts were not analysed by the D.I. have not been included in the estimates provided in this table. These exclusions are of minor significance, however: the aggregate of (P + B) is very close to the published totals in all years.

a. Equal to V.3 (see above).
b. Equal to V.2 - V.3.
c. Equal to V.1 - V.3.
d. G exceeds P in aggregate in two years even though it is constrained not to exceed the absolute value of P, because P takes on negative values more frequently.

activity.

The goodwill recorded in the acquirer's books, the key variable in estimating the bias in profitability, is appreciably lower than the market premium (it is of course constrained to be no greater - see above); but it is still around a third of book value. It also fluctuates much less violently than the market premium, so that any bias which it produces in profitability measures is unlikely to vary a great deal between mergers undertaken in different years.

Table D.C. reports the effect on profitability of this goodwill increment to the assets of an amalgamation. In the year of acquisition, adjusted profitability (with G deducted from the denominator) was typically between about 1 and 3½ percent higher than unadjusted profitability. In the subsequent year (when 2G is deducted from the denominator), the difference ranged between 1.3% and 5.5%. Of course, for a persistent acquirer the difference would be cumulative and could far exceed these averages: these estimates include the effects of only a single year's acquisition activity.

TABLE D.C.

The effect on profitability of goodwill arising on consolidation

Year of acquisition	Adjusted profitability ÷ Year of takeover[a]	Raw profitability (%) Subsequent year[b]	Number of acquirers	Number of acquirers surviving to subsequent year
1964	102.32 (0.50)	103.34 (1.00)	60	58
1965	102.23 (0.45)	103.52 (1.02)	70	69
1966	100.80 (0.05)	101.35 (0.11)	55	52
1967	101.27 (0.15)	102.31 (0.41)	68	63
1968	103.38 (1.07)	105.55 (2.65)	120	117
1969	102.90 (0.68)	103.82 (1.27)	91	76
1970	101.71 (0.22)	102.67 (0.56)	86	85
1971	103.68 (1.11)	103.83 (0.54)	46	15

a. Adjusted profitability for the year of acquisition as defined above (D.ii).
b. Adjusted profitability for the year after acquisition as defined above (D.iii).

Raw profitability in year j is always defined as $2U_j/(D_j + D_{j-1})$ (U being profit, and D net assets).

The standard deviation of each ratio is given in brackets beneath the mean of the ratio.

Appendix E

Directors' Pay, Growth and Profitability*

The last fifteen years have witnessed a series of theoretical works that have sought to replace the traditional motive of company directors, maximisation of profit, with the maximisation of some form of growth.[1] In support of this new maximand, several writers maintain that increases in size present overwhelmingly greater material incentives to directors than do increases in profitability. Several analysts have reviewed the evidence for this contention, using correlation or regression techniques to estimate the respective influence of size and profitability on pay. Studies before 1970 obtained results that were surprisingly decisive by the standards of applied economics, and reported in favour of the "managerial theorists'" arguments with remarkable unanimity.[2] The relation between size and pay was found to be positive and passed the usual statistical significance tests with flying colours, whereas that between profitability and pay earned only scorn: the estimated coefficient was not significantly differ-

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*This appendix is the joint work of G. Whittington and myself. An earlier version is to be published in the Journal of Industrial Economics, August 1975.

1. For example, Baumol (1967), Penrose (1959), Marris (1964), etc.

2. Roberts (1956) concludes that the "relationship (of executive compensation) to the level of profit is superficial and disappears when the influence of size upon both compensation and profit is taken into account." Marris (1964) concurred with Roberts in holding that "profitability had no apparent effect on salaries." And McGuire, Chiu and Elbing (1962) found "that sales and executive compensation are significantly correlated in five of the seven cases given; while profits and executive compensation are not significantly correlated."

   A paper by Cosh (1975), which examines these relationships for U.K. data, appeared after this study had been completed. It reaches very similar conclusions to the analyses of U.S. data which appeared before 1970; and its interpretation too requires the qualifications applied below to the earlier work.

ent from zero even at the permissive 5% level.

In 1970 the harmony was disturbed by Lewellen and Huntsman (1970), who declared, on the basis of new estimates, that "... reported profits are substantially more important in the determination of executive compensation than are sales - indeed sales seem to be quite irrelevant ..."[3] This paper, using hitherto unavailable data for a very large sample of U.K. companies,[4] reconciles these apparently conflicting statistical results; and, in interpreting them, rejects both extreme positions.

a. <u>The Model</u>

The managerial theorists contend firstly that, above a certain growth rate, increases in a company's growth rate are possible only at the expense of the profit rate; and that market forces leave directors some discretion in their choice of growth/profitability combination.[5] This opens the way for a conflict between the interests of directors and those of shareholders (if the latter are served only by profit maximisation). Secondly, these theorists allege that, in decisions

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3. In one respect, Lewellen and Huntsman's paper could boast superiority over both the earlier work (see footnote 2) and this study; data was available for forms of income other than the salary, fees and bonuses relied upon here (for instance for stock options which are often thought to be more sensitive to profitability). In the light of Lewellen and Huntsman's findings, neglect of these other components would not, however, seem to restrict conclusions based on the limited measure: typically, the broader definition of income proved to be no better explained by profitability than the narrow variant.

4. Only since the 1967 Companies Act have U.K. companies been required to disclose information about individual directors' pay; such data were only accessible to us for all companies from 1969.

5. This formulation follows Marris (1964) in particular.

on directors' pay, a far higher premium is placed on growth than on profitability. This means that the salary system, far from resolving the conflict of interest by bribing directors to pursue shareholders' objectives, will instead induce directors to trade profitability for growth.

The claim that pay is more dependent on growth than on profitability has been investigated here by estimating for cross-section data the model:

(1) directors' pay = a + b.log size + c.rate of return

Underlying the model is the assumption that, over the whole range of sizes and profit rates, any constant <u>absolute</u> difference in profitability will be associated with a constant <u>absolute</u> difference in directors' pay; and, over the whole range of sizes, any <u>proportionate</u> difference in size will be associated with a constant <u>absolute</u> difference in directors' pay. This formulation of the relationship between size and directors' pay is that which is most consistent with the view that directors are likely to be paid according to the proportionate growth rather than the absolute growth of their firms: thus £100,000 of extra size will add more to the pay of the directors of a £1 million firm than to that of the directors of a £10 million firm.[6]

If the cross-section relationship (1) represents the payment rates applicable to the average firm, the estimated slope coefficients can

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6. This form of relationship is plausible in view of the shape of the frequency distributions for the different variables: the size distributions are strongly positively skewed, while only a slight positive skewness is exhibited by pay or profitability (see annex, Table E.F).

be used to infer the relative rewards directors might expect from alternative policies with various growth and profitability implications, although it is argued below, the process of inference involves important simplifying assumptions.

b. The Estimated Relationships

The model was estimated for the years 1969, 1970 and 1971 using a variety of pay and size measures. However, in the text the results of only one variant, common in the literature, are reported: pay is defined as that of the highest paid director, sales are used as the size measure, and the current year's rate of return is employed. The results for other variants of the model, as well as a fuller description of the data, are provided in the annex, where it can be seen that none prompts a radically different conclusion from that reported here, and that the choice of the specific model shown in the text does not yield conclusions specially favourable to our interpretation.

At first sight the results presented in Table E.A. might seem roughly to confirm the standard conclusions.[7] In terms of both statistical and economic significance, size appears to trump profitability. The reliability of b (as reflected in its t value) is much greater than that of c. In economic terms, the model predicts that a shift from

7. Roberts (1956) (1959) and McGuire, Chiu and Elbing (1962) used correlation analysis, and the rough similarity of our results to theirs is confirmed by the simple correlations referred to in the annex (Table E.G).

the average to the top 5% of the respective distributions[8] would, in 1969, have increased salary by approximately £10,000 p.a. in the case of size, as against only approximately £2,000 p.a. for profitability. Consequently, the conclusion of Roberts (1956) (1959), echoed by Marris (1964) and by McGuire, Chiu and Elbing (1962), that, compared with size, profitability has little or no effect on salaries, might not seem to call for drastic revision: profitability could be promoted to a somewhat more important minor part, but with size retaining the lead role.

One step implicit in the managerial theorists' case here, however, is a dubious one. They evidently argue that since the premium on size outweighs that on profitability, so the premium on changes in size, that is growth, will be paramount. This move can be challenged because, although the range of experience represented in the cross-section observations may be attainable by the individual firm in the case of profitability, it surely is not in the case of size. While very swift progress from the lower to the upper tail of the profitability distribution (and vice versa) is not uncommon (see Whittington (1971), p.86), a comparable drastic shift within the size distribution in the space of a few years is most unlikely. To make the transition from smallest to largest of those companies used in this study would imply a 750 fold increase in size; and

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8. Taken as the mean of the variable plus two standard deviations, on the assumption that the distribution of the variable is normal.

since actual annual growth rates much above 20% are unusual,[9] such a change would typically take many years. Accordingly, the exercise carried out above which purports to evaluate the impact on salary of the two explanatory variables, by comparing "equivalent" shifts within their distributions, produces misleading results.

The relevant exercise, for inferring the consequences of changes through time from the static model and comparing the incentive to grow with that for raising profitability, would instead confine predictions of pay increases to those associated with the feasible growth and profitability achievements of the individual firm.[10] Table E.B. has been prepared on this basis, focussing on the range of growth rates actually experienced over time, rather than on the arbitrary dispersion of size observations at a single point in time. It draws on the regression slopes reported in Table E.A. to present the additional pay the director might be expected to receive for raising the growth rate or profitability from the mediocre to the outstanding, that is by increasing either performance measure from

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9. Singh and Whittington (1968) document extensively the actual growth rates achieved by U.K. companies. Constraints on the growth of firms are imposed both by internal difficulties (see especially Penrose on the problems of expanding the management team), and by factors external to the firm, such as the growth of a company's market or the national economy (on the latter, see Rowthorn (1971).

10. Better still for this purpose, the relationships would be estimated directly from observations of actual changes through time. This has been attempted (see below), but the "static" results have still been afforded pride of place firstly because the time period for the dynamic exercise is necessarily so short, and secondly so that the results may be directly reconciled with earlier work which has concentrated on static relationships.

TABLE E.A.

The regression of directors' pay on log size and profitability.

Year	Constant term	Regression Coefficients		
	a	b	c	R^2
j = 1969	-23896	3820	97	.345
	(-14.6)	(22.8)	(5.1)	
j = 1970	-23698	3872	68	.375
	(-15.3)	(24.5)	(3.9)	
j = 1971	-24025	4002	46	.395
	(-15.6)	(25.6)	(2.8)	

$$D_{ij} = a + b.\log S_{ij} + c.R_{ij} + e_{ij}$$

D_{ij} = salary, including bonuses, of highest paid director (£) for the ith company for year j.

S = sales (£000)

R = rate of return (%)

e = stochastic error term

Source: Published accounts of 1008 major U.K. quoted companies which continued in existence from 1967 to 1971 (see annex and appendix F. for further details).

Note: The t value of each coefficient is reported in brackets under that coefficient. All the coefficients are significantly different from zero at the 1% level. The constant term is expressed in £'s of directors' pay and the other coefficients in £'s pay per unit change in the relevant variable. In 1969, for example, a unit difference in the natural log of size was associated with a difference of £3,820 in pay, while a difference of one percentage point in the rate of return was associated with a difference of £97 in pay.

Certain extreme values were omitted before estimating this and subsequent models.

The results of the same exercise using alternative measures of salary, size and rate of return are reported in the annex (Table E.H).

its respective mean to two standard deviations above the mean. In the case of profitability, this calculation merely involves the application of the estimated coefficient c to the relevant change in profitability. In the case of growth, the calculation is almost as simple because the logarithm of the growth multiple ([1 + g], where g is proportionate growth) is the change in the logarithm of size: the logarithm of the relevant growth multiple is therefore applied to the estimated coefficient b.[11]

In view of the established interpretation, the results shown in Table E.B. are quite startling: the profitability premium exceeds that for growth in two of the three years, while in the third, the benefits for profitability are not drastically less than those for growth.[12]

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11. The average and standard deviation of annual growth rates are those of U.K. quoted companies for the period 1964-9 which are available from another study. For consistency, the profit rate statistics are taken from the same group, though in fact they are very similar to those for the sample used in the regressions.

    As these growth estimates include the contribution of inflation to nominal growth, whilst the static cross-section estimates are necessarily in constant prices, they over-estimate the feasible real growth of companies, and hence cause the premiums on growth in Table E.B. to be inflated.

12. It might be objected that a director's salary boost for moving to a much bigger company would still far exceed that for attaining the maximum possible profitability in his present firm. However, though this might be a significant factor in explaining directors' personal strategies, it is irrelevant to the question of how motivation impinges on the company's policy: someone has to choose for the company between different profitability and growth combinations, and the possibility of changing to a company of vastly bigger size, though perhaps available to its directors, is not open to the company. In fact, executive mobility has been found to be low (see Roberts (1956) and (1959): it may well not loom large in directors' personal strategies.

TABLE E.B.

The premium on growth and profitability.

Year	Achievement	Performance Variable	
		Growth of Sales	Profitability
1969	A	344	1484
	B	1413	2406
1970	A	348	1040
	B	1433	1687
1971	A	360	704
	B	1481	1141

A: Additional payment to the highest paid director for raising the performance variable from zero to its mean (£).

B: Additional payment to the highest paid director for raising the performance variable from its mean to two standard deviations above its mean (£).

Source: Derived from the regression estimates reported in Table E.A. by the method described in the text.

Note: The results of the same exercise using alternative measures of salary and size are reported in the annex (Table E.I).

Of course, all that these calculations assess is the economic significance of the regression coefficients. By contrast, earlier analysts have relied heavily on the relative statistical reliability of their estimates in discriminating between the potential influences on directors' pay, and finding in favour of growth. It is certain, however, that the regression of pay on growth, by restricting attention to the zone of observations adjacent to an individual firm's position in the size distribution and attainable by that firm would diminish the relative reliability of the growth coefficient, b (as reflected in its t value), compared to that which is obtained by regressing pay on size.[13] The extent of this effect is uncertain, and there are further consequences of the transition from the use of size to the use of growth as a regressor which are discussed below. It is therefore misleading to rely on the relative stati-

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13. Suppose, for the sake of argument, that the model,

    pay = a + b.log size

    were estimated for two samples, the first being that on which our regressions have been performed, and the second similar in all respects except that the range of the regressor size was drastically reduced. Thus, given:

$$t_b = \frac{\hat{b}\sqrt{x_i^2}}{V}$$

$\hat{b}$ (the estimated regression coefficient), V^2 (the residual variance) and the size of the sample are common to both samples. The range of x_i (size of the ith company minus mean size) is the only difference. Necessarily, the sample with the restricted range of sizes (smaller $\sqrt{x_i^2}$) has the lower value for t_b.

See Wonnacott and Wonnacott (1970), page 23, for a fuller argument.

stical reliability of the estimates of the effect of size on pay in drawing inferences for the effects of growth.

c. The "Dynamic" Extension

The question of how pay is affected by growth can be investigated more directly by estimating (again in cross-section) a model complementary to model 1 above:

(2) Δdirectors' pay = a + b.Δlog size = c.Δrate of return

It is surprising that previous studies have all preferred to infer the effects of growth from those of size, rather than attempting direct estimation.

Table E.C. presents the results of estimating model (2) where the changes are those recorded between 1969 and 1971 in the particular variables used for Table E.A.[14] The new results confirm our reservations about the inferences for the effects of growth which can be drawn from model 1. The movement of pay with profitability through time (reflected in c) is consistent with the relation across firms observed for the static model; yet that of pay with changes in size (reflected in b) is much reduced in comparison with model 1.

Again, the economic significance of the two slope coefficients is illustrated by comparing the predicted rewards for outstanding as

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14. So that the regression estimates were more directly comparable with the static version 1, despite the high rate of inflation at this time, Δdirectors' pay was expressed in constant prices (see the general discussion of the impact of inflation in the annex).

    Again, variants of the model with different measures of pay and size were estimated. See annex, Table E.J.

opposed to mediocre growth or profitability performance: the comparison is presented in Table E.D. the counterpart of the "static" Table E.B. It can be seen that the previous conclusions are reinforced: considering comparable achievements in terms of growth or profitability within the period, the premium on profitability is indeed at least as great as that for growth - in this dynamic case it is in fact almost four times greater. Moreover, the relatively superior statistical reliability of b observed for the static case disappears when the changes in size are automatically constrained, in the dynamic case, to those actually attained by companies.[15]

Though, in terms of both economic and statistical significance, the dynamic results appear to support the interpretation given for the static model, too precise a construction should not be placed on the comparisons of estimates obtained for models 1 and 2: the link between the two is not without difficulties. Model 2 was designed as an analogue of model 1, obtained simply by subtracting the static equation for each company at the beginning of a period from that at the end of the period:

$D_{ij} = a + b.\log S_{ij} + c.R_{ij} + e_{ij}$

minus $D_{ij-1} = a + b.\log S_{ij-1} + c.R_{ij-1} + e_{ij-1}$

gives the dynamic equation:

$D_{ij} - D_{ij-1} = (a - a) + b.(\log S_{ij} - \log S_{ij-1}) + c.(R_{ij} - R_{ij-1}) + (e_{ij} - e_{ij-1})$

There are, however, three reasons in addition to that discussed

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15. As predicted in the discussion above of the influence of the regressor's range on the coefficient's t value.

TABLE E.C.

The regression of change in directors' pay on log growth and change in rate of return.

Constant term a	Regression Coefficients		R^2
	b	c	
-626	1601	108	.09
(-3.6)	(3.1)	(8.7)	

$\Delta D_{ij} = a + b.\Delta \log S_{ij} + c.\Delta R_{ij} + e_{ij}$

i = ith company

j = the period 1969 to 1971 (differences, Δ, are 1971 flows, less 1969 flows).

R = = rate of return (%).

D = salary of highest paid director in 1971 prices (£)

S = sales (£000)

e = stochastic error term

Source: As in Table E.A.

The t value of each coefficient is reported in brackets under that coefficient. All the coefficients are significantly different from zero at the 1% level. A unit change in the natural log of size was associated with a rise of £1,601 in pay, while a rise of one percentage point in the rate of return was associated with an increase of £108 in pay.

Note: Estimates of the model using alternative salary and size measures are reported in the annex (Table E.J.).

TABLE E.D.

The premium on growth and profitability

Period	Achievement	Performance Variable	
		Growth of Sales	Profitability
1969-71	A	144	1652
	B	592	2679

A: Additional payment (£) for raising the performance variable from zero to its mean.

B: Additional payment (£) for raising the performance variable from its mean to two standard deviations above its mean.

Source: Derived from the regression estimates reported in Table E.C.

Note: The results of a similar exercise using alternative salary and size measures are reported in the annex (Table E.K.).

earlier[16] why the size or reliability of the estimated coefficients in the static and dynamic cases may not correspond precisely:

(i) Even if the underlying real relationship is constant, the coefficients relating the nominal values of the variables will change with inflation (see the annex): so a, b and c may differ in the static equations at time j-1 and j.

(ii) It seems likely that, insofar as the error term represents the relative generosity of the pay policy of the individual firm, e_{ij} will be positively correlated with e_{ij-1}, since there is no reason to expect that companies which initially pay above or below the norm described by the regression will cease to do so.[17] This would mean a lower residual variance for the dynamic than for the static model, with correspondingly higher t values for all the individual coefficients.

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16. See the final paragraph of section b, and footnote 13.

17. This problem could be dealt with by estimating an error component version of model (1) from pooled cross-section and time series data. Such a model might explicitly recognise that the error term has several components, e.g. (1) a 'time' component, (2) a component unique to each individual firm, and (3) a component unique to the individual industry (see footnote 26). The estimation of such a model from our present data would, however, pose a considerable computing task. Moreover, it would require an assumption that the population slope coefficients do not change from year to year - an assumption which is likely to be violated under inflation. Some adjustment of the data to allow for inflation would certainly be necessary (see annex). Error component problems are discussed in the context of similar data by Kuh (1963), Chapters 4 and 6.

(iii) There is a strong theoretical argument for expecting the observed values of b and c to change over time, and to differ for dynamic and static regressions, even in a regime of constant prices. Analogously with the movement of consumption or dividend distributions[18] in permanent income theories, pay may well adjust to size and profitability changes only with a lag. And indeed, as this argument suggests, average profitability for the three years ending in year j does explain pay in year j better than does profitability in year j alone. Accordingly, even if the underlying "ideal" relationship were constant, the relationships observed at particular times (or over any period) might represent various stages of (or movements in) an unfulfilled adjustment process, and, simply because of lags, might differ both from the ideal and among themselves.

In summary, for all these reasons, even with a constant structural relationship, estimates of essentially the same model at different times and through time may differ considerably.

d. The Lewellen and Huntsman Restoration of Profitability

Lewellen and Huntsman propose initially a model similar to that adopted above to discriminate between the influence of profits and sales on pay. As a starting point for their argument they propose the specification:

(3) $D_{ij} = a + b.S_{ij} + c.P_{ij} + e_{ij}$

where S is sales, P is profits, and the other variables are as

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18. See Lintner (1956) in particular.

defined above. Noting, however, that this specification poses the statistical problems of multicollinearity (avoided in our formulation by the use of the rate of return in place of total profits, which removes the "size of firm" element from profitability) and heteroscedasticity,[19] they attempt to sidestep these difficulties by employing an amended specification:

$$(4)\quad \frac{D_{ij}}{A_{ij}} = \frac{a}{A_{ij}} + b.\frac{S_{ij}}{A_{ij}} + c.\frac{P_{ij}}{A_{ij}} + \frac{e_{ij}}{A_{ij}}$$

where A is assets and P/A is the rate of return, R. It is this stage of their work which prompts the "reversal" of earlier conclusions; but its economic rationale is open to question: model 4 actually eliminates the influence of size (represented by assets) on pay, the main concern of earlier work, asking only what is the influence of the profit rate and the sales-asset ratio on directors' pay. This is quite different from the question posed by earlier writers: and it is not surprising, therefore, that Lewellen and Huntsman arrive at an apparently different conclusion from that of earlier writers.

Size (as represented by assets) is absent from equation (4), but might be reinstated by inserting a constant term (since $A_{ij}/A_{ij} = 1$). Lewellen and Huntsman report that they suppressed the constant term because, when it was present, it was not statistically significant.

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19. Heteroscedasticity is not a serious problem in large sample studies, since its effect is to reduce the efficiency of the estimates rather than imparting a bias: we do not therefore consider it to be a serious drawback of our own analysis. Our estimates, despite heteroscedasticity, are still unbiased and consistent; and we have more than one thousand observations, so that the lack of efficiency of our estimates is not serious.

However, the lack of statistical significance does not necessarily imply lack of quantitative importance. Furthermore, if our specification (equation (1) above) is correct, there is a curvilinear (logarithmic) relationship between size and pay: this relationship might not be adequately tested by fitting the linear approximation embodied in the constant term ($\log A_{ij}/A_{ij}$ being the correct specification).[20]

To illustrate this objection, and the fact that the conclusions both of earlier writers and of Lewellen and Huntsman may be derived from the same data, an extension of model 1 above has been estimated:

$$(5)\ D_{ij} = a + b.\log A_{ij} + c.R_{ij} + d.\frac{S_{ij}}{A_{ij}} + e_{ij}$$

For comparability with Lewellen and Huntsman's model this formulation discriminates between the profit rate and sales-asset ratio as explanations of pay; but, in addition, it yields an estimate of the impact on pay of assets. The regression results, presented in Table E.E., echo and counterpose the figures of both sides in the debate. True, as Lewellen and Huntsman argue, the influence of the sales-asset ratio is very weak compared with that of profitability. As the table shows, in one year of the three reported, d was not significantly different from zero at the 1% level,[21] and in another year

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20. This criticism of Lewellen and Huntsman is made by Yarrow (1972), p.159.

21. The 1% level is used, rather than the more common and less stringent 5% level, because our large number of observations means that the chance of a point estimate being accepted is greater (the standard error being lower) than in the smaller samples which are typically used.

barely so; whilst, in 1969, moving from the mean to two standard deviations above the mean of the sales-asset ratio implies an increase in pay of only £400. As against this, in line with the results of earlier writers, the economic and statistical significance of size is decisively reaffirmed. This fact, crucial for the managerial theories, is thus compatible with the estimates of Lewellen and Huntsman, despite their claims to the contrary.

e. The Results in Perspective

Notwithstanding the exercise performed by Lewellen and Huntsman, size is confirmed as being of overwhelming importance in the explanation of the level of directors' pay. However, the usual inference of earlier writers, that the pay incentive offered for growth will outstrip that for profitability, has been qualified: when just the consequences of the limited range of policies open to the firm in any one year are considered, it emerges that growth pays no better than profitability.

However, even this conclusion has to be set in perspective. Though the comparison of increases in growth and increases in profitability in Tables E.B. and E.D. is appropriate to the managerial theories of motivation, there remains an asymmetry between the growth and profitability premiums reported. For while the profitability payment is received in subsequent years only so long as that element of performance is maintained, the influence of growth on pay has a cumulative or "ratchet" effect: on just the weak assumption that the current year's closing size is maintained (that is, even allowing a zero growth rate in subsequent years), the growth premium is paid not just in the year in which any growth is achieved, but for ever after.

TABLE E.E.

The influence on pay of size, profitability and sales intensity.

Year	Constant term a	Regression Coefficients b	c	d	R^2
j = 1969	-25771	4233	127	101	.40
	(-16.6)	(25.9)	(6.8)	(1.0)	
j = 1970	-24755	4218	79	224	.42
	(-16.8)	(27.0)	(4.7)	(2.3)	
j = 1971	-24891	4295	57	375	.43
	(-16.8)	(27.5)	(3.5)	(3.6)	

$$D_{ij} = a + b.\log A_{ij} + c.R_{ij} + d.\frac{S_{ij}}{A_{ij}} + e_{ij}$$

D_{ij} = pay of highest paid director (£) for the ith company for year j

A = total assets (£000)

R = rate of return (%)

S = total sales (£000)

e = stochastic error term

Source: As Table E.A.

All the coefficients except d in 1969 are significantly different from zero at the 1% level. The constant term is expressed in £'s of directors' pay, and the other coefficients in £'s of pay per unit change in the relevant variable. In 1969, for example, a unit difference in the natural log of size was associated with a difference of £4,233 in pay; a difference of one percentage point in the rate of return with a difference of £127 in pay; a difference of one in the sales-assets ratio with a difference of £101 in pay.

Consequently, the relative importance of the pay off for growth or profitability hinges on the director's time horizon; the stream of benefits arising from additional growth in the current year may yet far outweigh the immediate "opportunity cost" in terms of profitability foregone.

Nevertheless, it may still be contended that the influence of profitability on the average level of directors' pay is non-trivial either in itself,[22] or in relation to the corresponding influence of growth, in rebuttal of the claim in earlier studies that "profitability had no apparent effect on salaries."[23 24]

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22. The predicted reward for shifting from average profitability to two standard deviations above average was, in 1969, 18.2% of the average pay of highest paid directors; for shifting from zero profitability to two standard deviations above average it was 29.5% of the average.

23. Marris (1964) p.84.

24. Of course, these conclusions relate to only one of several elements in managerial reward. Lewellen (1968) and (1971) has argued that other components of directors' income, notably stock options and income from shareholdings, increase their concern to maximise those variables such as profitability, dividends and share price which are of interest to shareholders. The Lewellen and Huntsman results did not suggest that the substitution of managerial compensation for salary payments in our analysis would have led to different conclusions as to the relative rewards of profitability and growth. However, we have no direct evidence as to how our results would be affected by the inclusion of ownership income, as defined in Lewellen's later work (1971). Again, the consequences of different policies for directors' security of tenure may seriously impinge on their action, though the implications for the growth-profitability trade off are not unambiguous. The threat could come directly from profit-oriented shareholders; as against this, both stability of performance (documented by Singh and Whittington (1968) and Whittington (1971) and immunity to take-over (documented by Singh (1971) and Whittington (1972) increase with size, and might be expected to prompt a preference for growth. Finally, a host of less tangible pressures and incentives influence directors: these are considered at length in Marris (1964). It should be noted that these factors will not all favour increased size: for instance, greater size can bring with it greater responsibility.

ANNEX TO APPENDIX E

1. The Variables

a. Directors' Salaries

Two limitations are imposed by the availability of data. Firstly, only directors' pay, and not that of other senior managers is considered. Secondly, our measures include only payments in the form of salaries, fees and bonuses, and not stock options or benefits from the ownership of shares. Two measures of salary have been used in the tests. On the one hand, that of the highest paid director typically represents the highest to which any employee of the company can aspire; and it has been used in the earlier work of both Roberts (1956) and (1959) and McGuire, Chiu and Elbing (1962). On the other hand, the average salary of directors' summarises the rewards of the top management group. However, as payments to part-time directors are included in this average, difficulties arise in comparing the payment level of companies with different proportions of part-time directors.[25]

b. Size

Results using three size measures were estimated. The capital measure, total assets at net book value, is sensitive to the vagaries of accounting measurement. The sales measure is relatively free of these measurement problems, though it may exaggerate the importance of firms in certain industries, such as wholesale distribution,

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25. A third available measure, the chairman's salary, was not included, because acute difficulties arise in comparing companies where the chairman is the chief executive with those where he is only a part-time employee. Commonly, where the chairman is also chief executive, he will also be the highest paid director.

which have an unusually high ratio of sales to either assets or value added.[26] The third measure, value added, has its attractions as a measure of the company's contribution to National Income. However, we face limitations in attempting to approximate a true measure of value added by adding total wages to total profits since U.K. companies are only required to disclose payments to U.K. employees.

Since none of the size measures is clearly optimal, results using all three were estimated. The results using sales are reported in the text since they occupy pride of place in the literature.[27]

c. Profitability

The measure of pre-tax profitability shows the rate of return on the long-term capital in the business. It too is subject to the limitations of accounting measurement.[28]

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26. If pay is also independently influenced by industry, then, when sales are used as the size measure, correlation between sales and industry might cause the industry influence to be wrongly attributed to size. Even in the absence of such a correlation, our model will have excluded an important explanatory variable if pay is systematically related to industry (see footnote 17). Industry differences in pay have not been examined here. Yarrow's (1972) work suggests that this may be an important omission.

27. A fourth size measure, profits, is available. But as our purpose has been to discriminate between the influence of size and profitability, using a measure which combines both elements could lead to confusion.

28. A fuller definition and discussion of this variable is presented in Singh and Whittington (1968).

2. A Profile of the Variables

Table E.E presents the mean, standard deviation and skewness moment for each variable used in the study. Table E.G. shows the interrelation of the variables revealed by simple correlation coefficients.

3. Variants of the Main Results

Tables E.H. to E.K. correspond to Tables E.A. to E.D.: they present the results of the exercises reported in these earlier tables, but carried out using alternative measures of pay and size.

4. The Impact of Inflation on the Regression Estimates

a. The Static Model

Suppose that in two successive years the real values of pay, size and profitability are unchanged, but inflation of x% takes place in the interval. Assume that the recorded value of profitability is unchanged, with both numerator and denominator increasing by the same proportion, while pay and size both increase by x%. Then, in model 1, the coefficient relating pay to size will be higher in the second year, and the intercept lower.[29] This is because the inflationary increase in log size would be uniform for all opening sizes, whilst the inflationary increase in pay would be positively related to opening size (being a proportion of opening pay which is itself positively associated with size). This prediction is borne out by the

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29. Moreover, the dispersion of individual observations about the average will be greater. For any combination os size and profitability there may be a number of companies each with different levels of directors' pay. On the assumption of uniform proportionate pay increases the divergence between above and below average payments will be greater after inflation.

successively larger coefficients relating pay to sales and to value added.[30]

b. The Dynamic Model

Similarly, in estimating model 2 for two situations, one a regime of rising and the other of constant prices, but both featuring the same real changes for each company, comparable conclusions emerge. For the "inflated" data, the constant term will be not zero but positive by an amount which expresses the average inflation increment of a director whose company's real size and performance do not change. In addition, the slope coefficients, b and c, will be greater. This reflects the fact that any real increment earned by virtue of increased size or profitability will be inflated by a uniform percentage. Finally, the dispersion of individual observations about the average relationship will again be greater.

Accordingly, for model 2, the change in directors' pay has been expressed in constant prices for comparability with the constant price static model 1.[31] The change in log size is not adjusted for inflation, since a uniform rate of inflation across all firms will imply that the change in log size is increased by a uniform amount for all firms. In consequence, the slope coefficient, b, will be free of the effects of inflation, but the constant term will

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30. Though this is not so for assets, whose value changes less predictably with inflation because of accounting conventions. This suggests that inflation may also distort the profit rate; see footnote 32.

31. It is assumed that companies do not suffer from money illusion and adjust real pay in response to real changes in the explanatory variables.

be lower than in a constant price system. If the numerator and denominator of profitability are inflated in equal proportions, the change in profitability will be unaffected by inflation.[32]

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32. This assumption may be unreasonable since denominator and numerator are affected differently by inflation. On the one hand, fixed assets are valued at inflated current prices only when they are replaced or (occasionally) revalued; on the other hand, profits are inflated by the inclusion of stock appreciation and the charging of depreciation on a (relatively low) historic cost basis (see chapter 2 and appendices A and B).

TABLE E.F.

Mean, standard deviation and skewness of the variables

Units of mean and S.D.	Variable	1969 Mean	1969 S.D.	1969 Skewness	1970 Mean	1970 S.D.	1970 Skewness	1971 Mean	1971 S.D.	1971 Skewness
£000	Highest paid director	13.2	8.7	2.7	13.8	8.5	2.3	14.7	8.7	2.2
	Average director's pay	7.3	4.0	1.8	7.5	4.0	1.5	8.1	4.4	1.6
£ million	Assets	20.7	73.1	12.7	21.9	77.1	12.6	24.0	82.1	12.0
	Sales	34.8	95.1	7.7	39.1	105.1	7.6	42.8	111.3	7.2
	Value added	7.9	21.7	9.5	8.7	23.3	8.7	9.6	25.1	7.9
%	Rate of return	16.9	12.3	-0.3	15.4	13.9	-2.8	16.2	18.4	-9.5
	3 year average rate of return	17.1	9.7	1.2	16.8	10.1	0.3	16.2	11.9	-1.2

CHANGES: 1969-71

Units	Variable	Mean	S.D.
£000	Highest paid director[a]	-0.293	4.1
	Average director's pay[a]	-0.194	2.2
Log	Log assets	0.132	0.258
	Log sales	0.197	0.274
	Log value added	0.178	0.333
%	Rate of return	-0.002	0.115

Source: As Table E.A.

a. Adjusted for inflation.

TABLE E.G.

Simple Pearsonian correlation coefficients

1 = Highest paid director
2 = Average director's pay
3 = Log total assets
4 = Log sales
5 = Log value added
6 = Rate of return
7 = 3 year average rate of return

		1	2	3	4	5	6
a. 1969	2	.73					
	3	.61	.59				
	4	.57	.59	.91			
	5	.62	.61	.93	.91		
	6	.07	.15	-.16	-.10	-.05	
	7	.04	.14	-.21	-.14	-.11	.90
b. 1970	2	.76					
	3	.64	.61				
	4	.60	.61	.91			
	5	.64	.62	.93	.91		
	6	.06	.11	-.09	-.07	-.03	
	7	.05	.12	-.16	-.11	-.09	.85
c. 1971	2	.75					
	3	.65	.61				
	4	.63	.61	.91			
	5	.65	.62	.92	.91		
	6	.05	.10	-.06	-.03	.04	
	7	.03	.10	-.07	-.05	-.01	.78
d. Changes[a]	2	.39					
	3	.12	.17				
	4	.15	.19	.57			
	5	.26	.20	.57	.62		
	6	.28	.26	.23	.19	.60	

Source: As Table E.A.

Note: Number of companies: 1008.

a. Change in each variable (1969 to 1971); directors' pay adjusted for inflation.

TABLE E.H.

Estimates of model 1 using alternative measures of pay and size.

$D_{ij} = a + b.\log S_{ij} + c.R_{ij} + e_{ij}$

1. i = ith company, j = year
   R = rate of return (%)
   D = salary of highest paid director
   S = total assets (£000)

Year	a	t_a	b	t_b	c	t_c	R^2
1969	-25420	-16.8	4216	25.9	129	7.0	.40
1970	-23867	-16.8	4177	26.8	80	4.8	.42
1971	-23329	-16.3	4219	27.1	59	3.6	.42
S = value added (£000)							
1969	-22220	-15.6	4307	25.3	78	4.2	.39
1970	-21675	-16.1	4328	26.7	49*	2.9	.42
1971	-21166	-15.8	4390	27.3	18	1.1	.43
2. D = average director's salary (£) S = sales (£000)							
1969	-10734	-14.9	1812	24.7	70	8.4	.39
1970	-10614	-14.7	1842	24.9	50	6.2	.39
1971	-11200	-14.3	1960	24.6	40	4.7	.38
S = total assets (£000)							
1969	-10379	-15.1	1880	25.4	83	9.9	.40
1970	-9911	-14.5	1899	25.4	55	6.9	.40
1971	-10392	-14.0	2014	25.0	46	5.4	.39
S = value added (£000)							
1969	-9137	-14.2	1943	25.3	61	7.3	.40
1970	-9017	-14.0	1980	25.6	41	5.2	.40
1971	-9240	-13.2	2081	24.9	26	3.1	.39
3. R = 3 year average rate of return (%) D = salary of highest paid director S = sales (£000)							
1969	-24492	-14.5	3852	22.9	114	4.8	.34
1970	-24732	-15.5	3914	24.7	101	4.7	.38
1971	-24152	-15.5	4011	25.6	49	2.6	.39
S = total assets (£000)							
1969	-26588	-16.9	4283	26.1	161	7.1	.40
1970	-25583	-17.4	4264	27.4	131	6.3	.43
1971	-23398	-16.2	4224	27.1	61	3.3	.42

S = value added (£000)

Year	a	t_a	b	t_b	c	t_c	R^2
1969	-23003	-15.7	4355	25.5	100	4.5	.39
1970	-22843	-16.4	4379	27.1	90*	4.4	.42
1971	-21449	-15.7	4400	27.4	31	1.7	.43

4. D = average director's salary (£)
S = sales (£000)

1969	-11488	-15.6	1847	25.2	94	9.3	.40
1970	-11396	-15.4	1874	25.5	76	7.6	.40
1971	-11501	-14.6	1972	24.8	52	5.4	.39

S = total assets (£000)

1969	-11427	-16.2	1938	26.2	114	11.2	.42
1970	-11033	-15.7	1956	26.3	88	8.9	.42
1971	-10662	-14.3	2024	25.2	57	6.0	.39

S = value added (£000)

1969	-9945	-15.1	1987	26.0	87	8.6	.41
1970	-9857	-14.9	2019	26.3	70	7.1	.42
1971	-9618	-13.6	2095	25.2	43	4.5	.39

Source: As Table E.A.

Note: All the coefficients are significantly different from zero at the 1% level, with the exception of those marked *.

TABLE E.I.

The premium on growth and profitability, using alternative measures of pay, size and profitability

1. Profitability = current, single year rate of return

Year	Achievement	Highest paid director Performance variable		Average director's pay Performance variable	
		Growth of total assets	Profitability	Growth of total assets	Profitability
1969	A	379	1974	169	696
	B	1560	3199	1270	2058
1970	A	376	1224	171	841
	B	1545	1984	703	1364
1971	A	380	903	181	704
	B	1560	1543	745	1141
		Growth of value added	Profitability	Growth of value added	Profitability
1969	A	388	1193	175	933
	B	1593	1935	719	1513
1970	A	389	750	178	627
	B	1601	1215	733	1017
1971	A	395	275	187	398
	B	1624	447	770	645
				Growth of sales	Profitability
1969	A			163	1071
	B			670	1736
1970	A			166	765
	B			681	1240
1971	A			176	612
	B			726	992

2. Profitability = average for three years ending in current year

Year	Achievement	Highest paid director Performance variable		Average director's pay Performance variable	
		Growth of total assets	Profitability	Growth of total assets	Profitability
1969	A	385	2463	175	1744
	B	1585	3993	717	2827
1970	A	384	2004	176	1346
	B	1577	3249	726	2183
1971	A	380	933	180	872
	B	1563	1513	740	1414
		Growth of value added	Profitability	Growth of value added	Profitability
1969	A	392	1530	180	1331
	B	1611	2480	740	2158
1970	A	394	1377	180	1071
	B	1620	2232	740	1736
1971	A	396	474	189	658
	B	1628	769	777	1066
		Growth of sales	Profitability	Growth of sales	Profitability
1969	A	347	1744	162	1438
	B	1425	2827	666	2331
1970	A	352	1545	171	1163
	B	1448	2505	703	1885
1971	A	361	750	180	796
	B	1484	1215	740	1289

A: Additional payment (£) for raising the performance variable from zero to its mean.

B: Additional payment (£) for raising the performance variable from its mean to two standard deviations above its mean.

Source: As Table E.B.

TABLE E.J.

Estimates of model 2 using alternative measures of pay and size

$$\Delta D_{ij} = a + b.\Delta \log S_{ij} + c.\Delta R_{ij} + e_{ij}$$

i = ith company
j = the period 1969-71
R = rate of return

1. D = salary of highest paid director (£)
   S = total assets (£000)

a	t_a	b	t_b	c	t_c	R^2
-442	-2.8	994	1.8	110	8.8	.08
S = value added (£000)						
-652	-3.9	1891	3.6	82	5.4	.09

2. D = average director's salary
   S = sales (£000)

a	t_a	b	t_b	c	t_c	R^2
-468	-5.1	1316	4.7	50	7.5	.09
S = total assets (£000)						
-357	-4.2	1115	3.7	50	7.4	.08
S = value added (£000)						
-313	-3.4	575	2.0	46	5.6	.07

Source: As Table E.C.

TABLE E.K.

The premium on growth and profitability using alternative measures of pay and size

Achievement	Highest paid director Performance variable		Average director's pay Performance variable	
	Growth of total assets	Profitability	Growth of total assets	Profitability
A	89	1683	99	765
B	368	2728	407	1240
	Growth of value added	Profitability	Growth of value added	Profitability
A	170	1255	52	704
B	700	2033	215	1141
			Growth of Sales	Profitability
A			117	765
B			481	1240

A: Additional payment (£) for raising the performance variable from zero to its mean.

B: Additional payment (£) for raising the performance variable from its mean to two standard deviations above its mean.

Source: As Table E.D.

APPENDIX F

The population, the data and detailed definitions of variables used in the thesis.

a. Introduction

This appendix provides some description of the data bank on which most of the thesis is based. It reports the data bank's coverage and its limitations (and refers to other sources of such information). In addition it provides a full listing of the quantitative variables included, grouped within their balancing accounts. Then detailed definitions of variables drawn from the data bank and used in the thesis are provided.

b. Scope of the data bank

The population incorporated in the data bank was defined at the beginning of the period to include all companies engaged primarily in manufacturing, distributive trades and some other services, and having stocks and shares quoted on United Kingdom stock exchanges. From 1948 to 1960 about 2500 companies typically qualified for inclusion on this criterion (the number varying from year to year as a result of births and deaths). From 1960, however, the population was truncated. Those with net assets of less than £0.5 million and gross income of less than £50,000 in 1960 or 1964 were excluded in subsequent years. The total number of companies covered by the data fell from 2,618 to 2,241 as a result of the exclusions in 1960. From 1969, companies with net assets of less than £2 million or gross income of less than £200,000 were excluded: a loss of some 350 companies. Though these excluded companies numbered many, however, their aggregate size was very small in relation to the total for quoted companies. Data were incorporated in the data bank for all eligible companies for every year from 1948 to 1971; and are included for some for 1972 as well.

Each 'company-year' of data contains the company's financial accounts, supplemented by various biographical details. These biographical details are recorded in 25 'indicative' variables. The financial accounts comprise a balance sheet, income appropriation account and sources and uses of funds statement (totalling 67 'quantitative' variables). For years from 1964, up to a further 83 quantitative variables are available to augment the basic accounting information.

In all then the data bank contains some 6 million items of information. As for the economic significance of this population, in 1970 it accounted for around 75% of the gross trading profits of all companies in the U.K.; and its operations generated around 25% of G.N.P.[1]

c. Sources of the data

The published accounts of eligible companies were collected and arranged in a standard format first by the National Institute of Economic and Social Research and then by the Board of Trade (now Department of Industry (D.I.)). Up to 1963 these bodies transferred the data to punched card; the Department of Applied Economics at Cambridge subsequently transferred much of the data from punched cards to magnetic tape (an arduous job when each card contains only some ten items of information), and the completion of this task in

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1. Sources: Department of Industry (1973) and Central Statistical Office (1972).

Edinburgh represented part of the work towards this thesis.

The other data processing which formed part of the doctoral research involved obtaining data from the D.I. for years after 1964 - this time on magnetic tape; the development of a single format for the diversely arranged sets of data for different periods; the extraction by hand from D.I. records of some 20,000 further items of information which were necessary either to secure consistency in the data bank or to permit the planned analysis, and their preparation as computer input;[2] and investigation and correction of inaccuracies or omissions revealed by a programme of tests of the data bank.[3]

d. <u>Remaining shortcomings of the data</u>

These may be summarised:

(i) <u>Non-comparable data for different years</u>

Firstly, the legal disclosure requirements for companies were changed in the 1967 Companies Act.[4] This caused one or two detailed account

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2. These included data on taxation and dividends under the arrangements for transition to the Corporation Tax System; on investment grants; on the causes of death of companies with incomplete records; on the identity of the acquirer (for the merger study in part 2 of the thesis); and company names, as well as the repair of detailed omissions in the existing computer file (see Department of Accounting and Business Method (1974) for more detail).

3. This work was carried out under the general supervision of G. Whittington, with Mrs. A. G. Harris programming the computer. Details of tests carried out, etc. are provided in Department of Accounting and Business Method (1974). A discussion of the problems of standardising company accounts is provided by Weaver (1971).

4. For the disclosure requirements of the Companies Acts, see Chartered Accountants' Trust for Education and Research (1967).

headings to be non-comparable (see section F.f. below); but generally produced welcome additional information to supplement that already required. Secondly, the D.I. has made major changes to the scope of the information which they included in their standardised accounts - especially in 1964 and 1969 - which means that some information in the data bank is available only for later years of the period. Some of these changes were a response to the changes in company disclosure requirements (see above); while others (e.g. the additional information provided on takeovers from 1964: see appendix D) were entirely on the initiative of the D.I. Thirdly, the D.I. made a major change in valuation methods in 1964 affecting external finance raised in the course of takeover (see appendix D). Finally, changes in the definitions of variables were prompted by developments in the institutional setting - for instance the introduction or abandonment of differential rates of taxation for dividends and retentions (see Meeks and Whittington (1975), appendix B), and the introduction of the investment grant system (see chapter 3 above and Department of Accounting and Business Method (1974)).

(ii) Deficiencies of historic cost accounting

These are dealt with at some length in chapter 2 and appendices A, B and D above.

(iii) Inadequate disclosure by companies

The 1967 Companies Act remedied some of the glaring omissions of data which are crucial in much economic analysis of company accounts - for instance of sales data which is so important in chapters 3 and 4 above. But, for instance, the sources and uses of funds statement is not yet a compulsory component of companies' published accounts; and those in the data bank are estimates derived from the other financial statements and other sources apart from companies' accounts (see appendix D). Again, the disclosure of the valuation and accounting treatment of takeovers leaves something to be desired (see appendix D).

(iv) Differences between companies in accounting practice

Some such differences defy the D.I. analysts' attempts to standardise companies' accounts. For instance, the interpretation of historic cost may vary between companies - especially in the valuation of stocks; companies variously capitalise or treat as current costs such items as research and development expenditure; and the lease or rent of fixed assets sometimes takes the place of outright purchase of such assets.

Many of these shortcomings are dealt with to some extent (and the data adjusted) where they impinge on the analysis (this is especially true of items (i) and (ii)). Where they are expected to produce a bias in the results but no allowance is made explicitly for the bias, the result is suitably qualified in the text. This brief account of the shortcomings of accounting information is intended to draw attention to the many disturbances in its measurement and to warn against too precise interpretation of the results. Nevertheless, such data are often used as the basis for national income accounting, are often the best available to management, and, insofar as they have been standardised and allowance has been made for specific biasses in the analysis above, are often better than the raw accounting information on which the shareholder must base his decisions.[5]

e. The indicative data

This section of the data provides classification and biographical information on a company. Each company has been allocated to a 3 digit industry by the D.I. within which it has a unique serial number. Certain other information is culled from the company's accounts, such as accounting and publication dates; and the company's name has been written to the computer file (partly by the D.I., and partly during our extension of the data). The other major items in this section are data on the cause of death and on partners in takeovers, which were added to assist the study in part 2 of the thesis. These were obtained from the D.I.'s handwritten records at Companies' House (their source for this information is discussed in appendix D).
Full details of the coverage and consistency of the quantitative data are given in Department of Accounting and Business Method (1974).

f. The quantitative data

The contents of the quantitative section are detailed in Table F.A., which also details for which years each item is universally available. Certain variables pose special difficulties for inter-year comparisons, however. These include:

1. Provisions

Some provisions included at T4 up to 1963 are included in reserves, T3, from 1964 - e.g. pension funds. Pension funds in particular are separately itemised from 1969, and we include them at T110. Other

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5. See Singh and Whittington (1968) for further general discussion of the deficiencies of accounting information.

TABLE F.A.

The quantitative data.

Reference Number 'T'	Name	Years Available
	Capital Reserves	
1	Issued capital: ordinary	48-
2	Issued capital: preference	48-
3	Capital and revenue reserves	48-
4	Provisions	48-63
5	Future tax reserves	48-
	Memorandum	
6	Contracts for capital expenditure outstanding	48-
	Liabilities	
7	Interest of minority shareholders in subsidiaries	48-63 69-
8	Long-term liabilities	48-
9	Bank overdrafts and loans	48-
10	Trade and other creditors	48-
11	Dividends and interest liabilities	48-
12	Current taxation liabilities	48-
	Memorandum	
13	Total depreciation	48-
	Assets	
14	Fixed assets: tangible, net of depreciation	48-
15	Fixed assets: intangible	48-
16	Fixed assets: trade investments	48-
17	Stocks and work in progress	48-
18	Trade and other debtors	48-
19	Marketable securities	48-
20	Tax reserve certificates	48-
21	Cash	48-
	Summary	
22	Total net assets	48-
	Sources of Funds	
23	Issue of shares: ordinary	49-

Reference Number 'T'	Name	Years Available
24	Issue of shares: preference	49-
25	Increase in liability to minority interests	49-63 69-
26	Issue of long-term loans	49-
27	Bank credit received	49-
28	Trade and other credit received	49-
29	Increase in dividend and interest liabilities	49-
30	Increase in current tax liabilities	49-
31	Increase in future tax reserves	49-
32	Balance of profit: depreciation provision	49-
33	Balance of profit: provision for amortisation	49-63
34	Balance of profit: other provisions	49- 63
35	Balance of profit: retained in reserves	49-
36	Other receipts	49-
	Uses of Funds	
37	Expenditure, less receipts, on fixed assets - tangible	49-
38	Expenditure, less receipts, on fixed assets - intangible	49-
39	Expenditure, less receipts, on fixed assets - trade investments & subsidiaries	49-
40	Increase in value of stocks and work in progress	49-
41	Increase in credit given - trade and other debtors	49-
42	Expenditure ex provisions	49-63 69-
43	Sundry expenditure	49-
	Adjustments	
44	Consolidation adjustment	49-
45	Conversion adjustment	49-63
46	Residual adjustment	49-63
	Balance	
47	Change in securities	49-
48	Change in tax reserve certificates	49-
49	Change in cash	49-
	Appropriation of Income	
50	Operating profit (before depreciation)	49-

Reference Number 'T'	Name	Years Available
51	Dividends and interest received (gross of income tax)	49-
52	Other income	49-
53	Interest paid on long-term liabilities gross	49-
54	Tax on current profit	49-
55	Dividend, ordinary	49-
56	Dividend, other	49-
57	To minority interests in subsidiaries, net of taxation	49-63
58	Prior year adjustments - tax	49-
59	Prior year adjustments - general	49-
	<u>Summary</u>	
60	Total capital and reserves	48-
61	Total liabilities	48-
62	Total fixed assets, net of depreciation	48-
63	Total current assets	48-
64	Total sources	49-
65	Total uses	49-
66	Total profit	49-
67	Total balance of profit	49-
	<u>Expenditure on Acquiring Subsidiaries</u>	
	<u>Consideration for Subsidiaries Acquired</u>	
68	Ordinary shares	64-
69	Preference, etc. shares	64-
70	Long-term loans	64-
71	Cash	64-
72	Previous holding added back	64-
73	Total consideration	64-
	<u>Excess Payment</u>	
74	Number of companies: accounts analysed	64-
75	Number of companies: accounts not analysed	64-
	<u>Excess Book Value</u>	
76	Number of companies: accounts analysed	64-
77	Number of companies: accounts not analysed	64-

Reference Number 'T'	Name	Years Available
	Companies Acquired (accounts analysed	
78	Number of companies	64-
79	Net tangible fixed assets	64-
80	Goodwill, etc.	64-
81	Investments	64-
82	Current assets (excluding investments)	64-
83	Unidentified assets	64-
84	Less: minority interests	64-
85	deferred tax reserves	64-
86	long-term loans	64-
87	current liabilities	64-
	Payment less Book Value	
88	Excess payment	64-
89	Excess book value	64-
	Companies Acquired (accounts not analysed)	
90	Book value	64-
91	Number of companies	64-
	Payment less Book Value	
92	Excess payment	64-
93	Excess book value	64-
	Unconsolidated Companies Acquired	
94	Assumed book value	64-
95	Number of companies	64-
96	Proceeds from sales of subsidiaries	64-
97	Amount written off subsidiaries	64-
98	Further investment in subsidiaries	64-
99	Upward revaluation of subsidiaries	64-
	Investment Grants	
100	Increase in investment grant reserve	
101	Transfer to profit and loss account	
102	Transfer to tax equalisation account	
103	Direct credit to profit and loss	
104	Amount deducted from fixed assets	
105	Other treatments	
106	Increase in investment grants due but unpaid	
107	Investment grants received	

Reference Number 'T'	Name	Years Available
	Miscellaneous Extra Information	
108	Investment grant reserve	69-
109	Asset replacement reserve	69-
110	Pension fund	69-
111	Tax equalisation reserve	69-
112	Debentures and mortgages	69-
113	Provisions	69-
114	Land and buildings gross of depreciation	64-
115	Plant, etc. gross of depreciation	64-
116	Total gross tangible assets	64-
117	Depreciation: land and buildings	64-
118	Depreciation: plant, etc.	64-
119	Cash paid for subsidiaries	64-
120	Quoted investments	69-
121	Market value of quoted investments	69-
122	Income from quoted investments	69-
123	Expenditure on hire of plant	68-
124	Overseas tax on profits of year	69-
125	Transfer to tax equalisation reserve and other deferred tax	69-
126	Transfer to asset replacement reserve	69-
127	Sales	68-
128	Exports	68-
129	Intangible assets: development and other deferred revenue expenditure	68-
130	Change in accumulated depreciation	68-
131	Change in deferred tax reserve	68-
132	Change in fixed assets due to revaluation	68-
133	Change in fixed assets due to currency devaluation	68-
134	Average number of employees	68-
135	Employees remuneration	68-
136	Total directors' pay	68-
137	Chairman's pay	69-
138	Highest paid director's pay	69-
	Directors' in the Following Income Bands	
139	0 - 2500	
140	2501 - 5000	
141	5001 - 7500	
142	7501 - 10000	
143	10001 - 20000	
144	20001 - 30000	
145	30001 - 40000	
146	40001 - 50000	

Reference Number 'T'	Name	Years Available
147	Over 50,000 .	
148	Schedule F payable	1965
149	Transitional tax relief: ordinary dividends	1966
150	Transitional tax relief: preference dividends	1966

provisions included at T4 up to 1963 appear in trade and other creditors from 1964. General provisions and provisions for exchange rate changes are itemised in the D.T.I. booklet from 1969, and we record their joint total at T113.

So T3, T4 and T10 may not be comparable for the two periods, 1948-63, and 1964 onwards. But more information on provisions becomes available in 1969.

2. Advances on Uncompleted Contracts

Up to 1968 these were deducted from the value of stocks by the D.T.I. From 1969, if such advances exceeded the value of stocks (as sometimes happens, for example, in shipbuilding firms), the excess was included with creditors and accruals, rather than show negative stocks. For inter-year comparability, we have continued to deduct such excesses from stocks.

3. Trade Investments

The distinction between 'trade' and 'other' investments was replaced by the 1967 Companies Act with the distinction between 'quoted' and 'unquoted' investments. The data supplied to us for 1964-8 by the D.T.I. was standardised on the format used from 1969: hence the distinction between 'trade' and 'other' investments is lost from 1964. From then, trade investments will appear with marketable securities at T19, leaving only investment in unconsolidated subsidiaries at T16. So T16 and T19, T39 and T47, and the Summaries (fixed assets, T62, and current assets, T63) will not be directly comparable for the two periods, 1948-63, and 1964 onwards.

In fact there was a discrepancy in the data for 1964-8 supplied to us by the D.T.I., arising from this change in the treatment of investments. This discrepancy and our correction of it are summarised in Department of Accounting and Business Method (1974).

4. Minority Interests

Amounts due to minority interests are not separated out in the appropriation account from 1964: they are included with dividends at T55 and T56. The increase in the liability to minority interests in the sources statement is not separately available from 1964-8, but is reinstated from 1969.

5. Taxation, Dividends and Investment Grants

1. From 1964, the D.T.I. format includes taxation and dividend payments in the uses statement. They represent the current year's provision (appropriation account) minus the change in the balance sheet. We rearrange the information, to show, in the sources statement, the change in the balance sheet as the current year's provision less the payment.

2. The definitions of taxation and dividends in the balance sheet, appropriation account and the sources statement, change as a result of the change to the Corporation Tax and Investment Grant system. In addition, the period of transition to Corporation Tax (1965-7) presents particular problems. Our treatment, and the extra data provided at T148-T150 are discussed in Department of Accounting and Business Method (1974).

3. From 1968, only tax equalisation reserves are included at T5: all other tax liabilities are recorded at T12.

6. Amortisation

Amortisation is not shown separately from depreciation from 1964.

7. Retentions

Transfers to tax equalisation and asset renewal reserves are shown separately by the D.T.I. from 1969. For comparability with earlier years, we have included these transfers with retentions at T35. We retain this separate information at T125 and T126.

8. Provisions

'Other provisions' at T34 are not separately detailed by the D.T.I. from 1964. Expenditure out of provisions is included with other expenditure at T43 from 1964 to 1968, but is separately available at T42 from 1969.

g. Detailed definitions of variables used in the thesis

Notation

m = last year of period

p = first year of period

o = p minus 1

n = number of years in the period

j = year indicator

Chapter 3

Table 3.A.

The general definition is:

$$\sum_{j=p}^{m} Q_j \div n$$

Where: Q_j = (T37-T32-T33+T38+T39-T68-T69-T70+T40+T41+T42+T44+T45+

$T46+T47+T48+T49-T27-T28-T29-T30)_j \div T22_{j-1}$

(Growth of net assets other than by takeovers which were externally financed).

$Q_j = (T32+T33)_j \div T22_{j-1}$

(Expenditure on replacement investment).

$Q_j = (T32+T33)_j \div T22_{j-1}$

(Depreciation provisions).

$Q_j = (T31+T35+T36-T43)_j \div T22_{j-1}$

(Retentions).

$Q_j = (T23+T24+T26-T68-T69-T70)_j \div T22_{j-1}$

(Long term external finance, except share for share issues, etc.).

<u>Figures 3.A. to 3.H.</u>

Each variable as defined below is divided by $(T13+T14)_{j-1}$ to give the deflated variable reported in the figures.

Age = $T13_{j-1}$

Capacity utilisation = $T127_j$ times minimum capital-output ratio for the five year period (i.e. expressing current output-capital ratio as a proportion of peak output-capital ratio).

Sales = $T127_j$

Change in sales = $127_j - T127_{j-1}$

Disposable retentions = $T25_j+T31_j+T35_j+T36_j-T43_j-M_j$

Where M_j = estimate of stock appreciation (see chapter 2) and where special procedures were adopted to measure T31 when the definition of T5 was changed in 1968.

Depreciation provisions = $(T32+T33)_j$

Net liquidity stocks = $(T19+T20+T21-T9-T11-T12)_{j-1}$

Gross investment = $T37_j$

Chapter 6

Table 6.A.

Expenditure on new subsidiaries = $T39_j$ (aggregated across all companies).

Expenditure on gross new investment = $T37_j$ (again aggregated).

Table 6.B.

The general definition is:

$$\sum_{j=p}^{m} Q_j \div n$$

Where: $Q_j = (T37-T32-T33)_j \div T22_{j-1}$

(Net new investment in fixed assets).

$$Q_j = (T38+T40+T41+T42+T43+T44+T45+T46+T47+T48+T49-T27-T28-T29-T30)_j \div T22_{j-1}$$

(Acquisition of net current assets, etc.).

$Q_j = T39_j \div T22_{j-1}$

(Acquisition of subsidiaries: for cash and by share for share exchange).

$Q_j = \left[(T7+T8)_j - (T7+T8)_{j-1}\right] \div T22_{j-1}$

(Acquisition of subsidiaries: by taking on minority interests and long term liabilities on acquisition).

$Q_j = (T32+T33)_j \div T22_{j-1}$

(Depreciation and 'replacement' investment).

Chapter 7

Equation (7.iii)

$U = (T66 - T32 - T33 - T34 + T59)$

$D = (T60 + T7 + T8 - T4) = T22$

Table 7.A., etc.

Size = T22

Chapter 9

Table 9.A., 9.B., 9.D., 9.E.

The general definition is:

$$\sum_{j=p}^{m} Q_j \div n$$

Where $Q_j = T39_j \div T22_{j-1}$

(Rate of growth by takeover).

$Q_j = 2(T66 - T32 - T33 - T34 + T59)_j \div (T22_{j-1} + T22_j)$

(Pre-tax rate of profit).

$Q_j = T37_j \div T22_{j-1}$

(Rate of growth by gross new investment).

$Q_j = (T37 - T32 - T33)_j \div T22_{j-1}$

(Rate of growth by net new investment).

$Q_j = (((T23 + T24 + T31 + T35 + T36 - T43)_j + (T7 + T8)_j + (T1 + T2 + T3 + T5)_{j-1}) \div$

$T22_{j-1}) - 1$

(Rate of growth of net assets).

$Q_j = (68 + T69 + T70)_j \div T22_{j-1}$

(Rate of growth by external finance: in exchange for subsidiaries).

$Q_j = (T23 + T24 + T26 - T68 - T69 - T70)_j \div T22_{j-1}$

(Rate of growth by external finance: for cash).

$Q_j = (T31+T35+T36-T43)_j \div T22_{j-1}$

(Rate of growth by retentions).

Opening size = $T22_o$

For goodwill as percentage of net assets, see definitions for appendix J.

Appendix C

Tables C.B., C.C., C.D., C.E.

For sources and uses of funds expressed as percentages of net assets, rate of growth of net assets, and rate of return on net assets, the definitions used in chapter 9 apply. For proportion of pre-tax income retained, etc. the definitions given for appendix J apply.

The pre-tax rate of return on equity assets is defined as:

$$\sum_{j=p}^{m} Q_j \div n$$

Where $Q_j = 2(T66-T32-T33-T34+T59-T53-P)_j \div ((T1+T3+T5+T7)_{j-1} + (T1+T3+T5+T7)_j)$

and P = net preference dividend appropriately grossed up to include income tax on preference dividends.

Table C.G.

The weighted average ratios reported in this Table correspond to the simple averages defined above in the following way:

$$\text{Weighted average} = \sqrt[n]{\frac{\sum_{j=p}^{m}(Q_j . T22_{j-1}) + T22_o}{T22_o}} - 1$$

Where simple average = $\sum_{j=p}^{m} Q_j \div n$

Appendix D

The key variables for this appendix, which relates so specifically to the variables in the data bank are defined in the appendix in terms of the 'T' sequence of variables.

Appendix E

The following variables were used in the regression analysis:

Salary of highest paid director = $T138_j$

Average director's salary = $T136_j \div \sum_{i=139}^{147} T_{ij}$

Total assets = $(T62+T63-T9-T10)_j$

Total sales = $T127_j$

Value added = $(T50-T32+T135)_j$

Rate of return: as defined above for chapter 9.

Appendix H

Table H.B.

The average rate of profit and rate of growth by takeover are as defined above for chapter 9.

Appendix J

Tables J.C., J.H., J.M., J.R.

The variables in those Tables are mostly defined for chapter 9.

But in addition, the rate of growth by takeover at book value =

$$\sum_{j=p}^{m} Q_j \div n$$

Where: $Q_j = (T39-T88-T89-T92-T93)_j \div T22_{j-1}$

Tables J.D., J.I., J.N., J.S.

The general definition is:

$$\sum_{j=p}^{m} H_j \div \sum_{j=p}^{m} Y_j$$

Where $Y_j = (T23+T24+T26+T32+T33+T35)_j$

and $H_j = (T23-T68)_j$	Issues of ordinary shares: for cash*
$T68_j$	Issues of ordinary shares: in exchange*
$T23_j$	Issues of ordinary shares: total
$(T24-T69)_j$	Issues of preference shares: for cash*
$T69_j$	Issues of preference shares: in exchange*
$T24_j$	Issues of preference shares: total
$(T26-T70)_j$	Issues of long-term loans: for cash*
$T70_j$	Issues of long-term loans: in exchange*
$T26_j$	Issues of long-term loans: total
$T35_j$	Retentions
$(T32+T33)_j$	Depreciation $\equiv$ Replacement investment
$(T37-T32-T33)_j$	Net fixed investment, tangible
$T38_j$	Intangible fixed investment
$T39_j$	Investment in subsidiaries, etc.
$T40_j$	Increase in stocks
$(T47+T48+T49-T27)_j$	Increase in bank balances, etc.
$(T41-T28)_j$	Increase in trade credit
$(T42+T43+T44+T45+T46-T25-T29-T30-T31-T34-T36)_j$	Other current and sundry

* Not available before 1964.

Tables J.E., J.J., J.O., J.T.

The general definition is:

$$\sum_{j=p}^{m} N_j \div \sum_{j=p}^{m} Z_j$$

Where $Z_j = (T50+T51+T52)_j$

and $N_j = (T32+T33+T34)_j$	Depreciation, etc.
$(T50-T32-T33-T34)_j$	Operating profit
$T51_j$	Dividends and interest received
$T52_j$	Other income
$T53_j$	Interest paid
$(T57-T59)_j$	Minority interests and prior-year adjustment
$T35_j$	Retentions

The definitions of taxation and of dividend payments were subject to special procedures to achieve consistency between tax systems. These lengthy procedures are detailed in Meeks and Whittington (1975); they are not repeated here since these particular variables are not specially emphasised in the analysis.

Tables J.F., J.G., J.K., J.L., J.P., J.Q., J.U., J.V.

The general definition is:

$G_o \div T22_o$ (opening balance sheet) $G_m \div T22_m$ (closing balance sheet)

Where G =

T1	Ordinary shares
T3	Reserves
T2	Preference shares
T8	Long-term loans

T5	Future tax
T7	Minority interests
T14	Fixed assets: tangible
T15	Fixed assets: intangible
T16	Fixed assets: trade investments
T17	Stocks
(T19+T20+T21-T9)	Net liquidity
(T18-T10-T11-T12-T4)	Other current and sundry.

APPENDIX G

Table G.A.

Industry Averages : Age Indicator

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.365	0.371	0.369	0.368	0.379
23. Drink	0.179	0.186	0.189	0.195	0.203
26. Chemicals	0.358	0.366	0.369	0.375	0.383
31. Metal Manufacture	0.381	0.389	0.389	0.391	0.408
33. Non-electrical Eng.	0.393	0.401	0.405	0.411	0.421
36. Electrical Engineering	0.380	0.391	0.385	0.389	0.397
38. Vehicles	0.343	0.348	0.357	0.353	0.350
39. Metal Goods, n.e.s.	0.373	0.382	0.384	0.388	0.393
41. Textiles	0.431	0.436	0.426	0.439	0.442
44. Clothing, Footwear	0.303	0.318	0.339	0.340	0.342
46. Bricks, etc.	0.378	0.390	0.395	0.396	0.400
47. Timber, etc.	0.342	0.336	0.329	0.341	0.331
48. Paper, Printing, etc.	0.375	0.382	0.385	0.379	0.383
49. Other Manufacturing	0.340	0.354	0.365	0.366	0.377
50. Construction	0.371	0.384	0.386	0.387	0.386
81. Wholesale Distribution	0.316	0.310	0.311	0.312	0.320
82. Retail Distribution	0.215	0.218	0.218	0.224	0.234
88. Misc. Services	0.202	0.214	0.215	0.217	0.221
ALL INDUSTRIES (pooled)	0.338	0.345	0.347	0.350	0.356

Table G.B

Industry Averages : Capacity Utilisation Indicator

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.879	0.889	0.874	0.884	0.906
23. Drink	0.872	0.828	0.859	0.872	0.932
26. Chemicals	0.832	0.862	0.832	0.835	0.824
31. Metal Manufacture	0.747	0.830	0.837	0.853	0.762
33. Non-electrical Eng.	0.826	0.842	0.863	0.861	0.845
36. Electrical Engineering	0.786	0.882	0.843	0.836	0.838
38. Vehicles	0.799	0.812	0.828	0.874	0.862
39. Metal Goods, n.e.s.	0.780	0.825	0.819	0.859	0.859
41. Textiles	0.819	0.896	0.866	0.822	0.791
44. Clothing, Footwear	0.820	0.861	0.898	0.847	0.878
46. Bricks, etc.	0.820	0.844	0.799	0.815	0.838
47. Timber, etc.	0.781	0.857	0.796	0.815	0.871
48. Paper, Printing, etc.	0.832	0.820	0.833	0.870	0.855
49. Other Manufacturing	0.838	0.833	0.823	0.875	0.835
50. Construction	0.798	0.821	0.787	0.801	0.816
81. Wholesale Distribution	0.816	0.863	0.829	0.796	0.773
82. Retail Distribution	0.833	0.876	0.855	0.874	0.907
88. Misc. Services	0.778	0.837	0.800	0.819	0.872
ALL INDUSTRIES (pooled)	0.814	0.850	0.837	0.844	0.845

Companies with zero values for sales were omitted from the averages for that year.

Table G.C

Industry Averages : Sales (deflated)

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	3.460	3.545	3.513	3.730	3.760
23. Drink	1.914	1.789	1.887	1.766	1.896
26. Chemicals	2,910	3.030	2,835	2,820	2.724
31. Metal Manufacture	3.242	3.322	3.209	3.278	2.870
33. Non-electrical Eng.	2.722	2.889	2.991	2.902	2.832
36. Electrical Engineering	2.936	3.351	3.213	3.201	3.225
38. Vehicles	3.391	3.533	3.505	3.627	3.493
39. Metal Goods, n.e.s.	2.481	2.548	2,575	2.709	2,743
41. Textiles	2.417	2.780	2.635	2.488	2.377
44. Clothing, Footwear	3.400	3, 749	3.735	3.673	3.803
46. Bricks, etc.	1.988	2.216	1.939	1.927	1.955
47. Timber, etc.	3.390	3.684	3.381	3.336	3.590
48. Paper, Printing, etc.	1.991	1.913	1.900	1.952	1.941
49. Other Manufacturing	2.637	2.890	2.836	3.094	2.843
50. Construction	5.573	5.601	5.458	5.588	5.710
81. Wholesale Distribution	6.296	6.486	6.118	6.002	5.833
82. Retail Distribution	3.789	4.066	3.915	4.015	4.110
88. Misc. Services	2.911	3.168	3.086	3.162	3.292
ALL INDUSTRIES (pooled)	3.252	3.416	3.322	3.336	3.315

Companies with zero values for sales were omitted from the averages for that year.

Table G.D

Industry Averages : Change in Sales (deflated)

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.219	0.257	0.233	0.278	0.314
23. Drink	0.110	0.091	0.145	0.098	0.172
26. Chemicals	0.194	0.295	0.222	0.224	0.161
31. Metal Manufacture	0.051	0.332	0.286	0.239	-0.013
33. Non-electrical Eng.	0.131	0.196	0.216	0.203	0.111
36. Electrical Engineering	0.119	0.309	0.246	0.268	0.202
38. Vehicles	0.186	0.265	0.239	0.339	0.242
39. Metal Goods, n.e.s.	-0.011	0.249	0.195	0.249	0.165
41. Textiles	0.036	0.271	0.138	0.084	0.096
44. Clothing, Footwear	0.162	0.221	0.131	0.166	0.274
46. Bricks, etc.	0.144	0.177	0.167	0.216	0.202
47. Timber, etc.	0.216	0.312	0.103	0.196	0.262
48. Paper, Printing, etc.	0.071	0.180	0.165	0.218	0.127
49. Other Manufacturing	0.168	0.293	0.166	0.227	0.195
50. Construction	0.288	0.260	0.173	0.214	0.291
81. Wholesale Distribution	0.136	0.322	0.195	0.232	0.178
82. Retail Distribution	0.228	0.283	0.234	0.211	0.251
88. Misc. Services	0.162	0.256	0.192	0.213	0.251
ALL INDUSTRIES (pooled)	0.138	0.252	0.194	0.210	0.182

Companies with zero values of sales for the current or previous year were omitted from the averages for that year.

Table G.E

Industry Averages : Disposable Retentions (deflated)

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.057	0.031	0.022	0.027	0.050
23. Drink	0.028	0.021	0.027	0.026	0.036
26. Chemicals	0.095	0.071	0.043	0.038	0.031
31. Metal Manufacture	0.063	0.045	0.056	0.025	0.041
33. Non-electrical Eng.	0.064	0.028	0.023	-0.003	-0.010
36. Electrical Engineering	0.079	0.048	0.033	0.012	0.027
38. Vehicles	0.093	0.058	0.035	0.011	-0.001
39. Metal Goods, n.e.s.	0.060	0.038	0.029	0.013	0.042
41. Textiles	0.055	0.035	0.021	-0.007	0.013
44. Clothing, Footwear	0.067	0.036	0.024	0.001	0.020
46. Bricks, etc.	0.066	0.049	0.032	0.034	0.053
47. Timber, etc.	0.069	0.058	0.007	0.001	0.078
48. Paper, Printing, etc.	0.066	0.042	0.032	0.026	0.035
49. Other Manufacturing	0.074	0.056	0.031	0.018	0.035
50. Construction	0.091	0.030	0.030	-0.013	0.011
81. Wholesale Distribution	0.070	0.046	0.038	0.014	0.034
82. Retail Distribution	0.058	0.049	0.041	0.036	0.052
88. Misc. Services	0.034	0.023	0.028	0.038	0.056
ALL INDUSTRIES (pooled)	0.065	0.041	0.031	0.015	0.030

Table G.F

Industry Averages : Depreciation (deflated)

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.060	0.060	0.058	0.062	0.060
23. Drink	0.027	0.027	0.029	0.028	0.031
26. Chemicals	0.070	0.072	0.069	0.070	0.070
31. Metal Manufacture	0.060	0.073	0.064	0.066	0.061
33. Non-electrical Eng.	0.064	0.061	0.063	0.061	0.058
36. Electrical Engineering	0.074	0.080	0.083	0.084	0.075
38. Vehicles	0.071	0.068	0.064	0.068	0.069
39. Metal Goods, ne.s.	0.055	0.057	0.057	0.058	0.056
41. Textiles	0.057	0.061	0.059	0.060	0.056
44. Clothing, Footwear	0.046	0.049	0.056	0.048	0.050
46. Bricks, etc.	0.066	0.067	0.061	0.061	0.061
47. Timber, etc.	0.058	0.059	0.059	0.057	0.058
48. Paper, Printing, etc.	0.061	0.057	0.058	0.058	0.054
49. Other Manufacturing	0.068	0.066	0.059	0.068	0.064
50. Construction	0.100	0.106	0.094	0.095	0.103
81. Wholesale Distribution	0.062	0.066	0.064	0.063	0.068
82. Retail Distribution	0.042	0.044	0.043	0.045	0.054
88. Misc. Services	0.053	0.056	0.054	0.053	0.056
ALL INDUSTRIES (pooled)	0.060	0.062	0.061	0.061	0.061

Table G.G

Industry Averages : Net Liquidity Balance (deflated)

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	-0.085	-0.087	-0.160	-0.165	-0.198
23. Drink	-0.044	-0.044	-0.090	-0.090	-0.093
26. Chemicals	-0.046	-0.026	-0.132	-0.160	-0.178
31. Metal Manufacture	-0.028	-0.018	-0.128	-0.191	-0.161
33. Non-electrical Eng.	-0.116	-0.074	-0.147	-0.208	-0.253
36. Electrical Engineering	-0.122	-0.096	-0.183	-0.221	-0.246
38. Vehicles	-0.179	-0.207	-0.259	-0.269	-0.278
39. Metal Goods, n.e.s.	-0.035	-0.025	-0.142	-0.194	-0.208
41. Textiles	-0.071	-0.048	-0.162	-0.193	-0.171
44. Clothing, Footwear	-0.182	-0.171	-0.257	-0.289	-0.263
46. Bricks, etc.	-0.057	-0.067	-0.164	-0.150	-0.146
47. Timber, etc.	-0.149	-0.129	-0.242	-0.234	-0.211
48. Paper, Printing, etc.	-0.022	-0.023	-0.094	-0.114	-0.116
49. Other Manufacturing	-0.045	-0.044	-0.143	-0.225	-0.203
50. Construction	-0.190	-0.145	-0.177	-0.194	-0.197
81. Wholesale Distribution	-0.180	-0.167	-0.251	-0.253	-0.258
82. Retail Distribution	-0.132	-0.116	-0.201	-0.208	-0.190
88. Misc. Services	-0.093	-0.102	-0.161	-0.170	-0.173
ALL INDUSTRIES (pooled)	-0.101	-0.085	-0.168	-0.195	-0.199

Table G.H

Industry Averages : Gross Investment (deflated)

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.112	0.119	0.138	0.111	0.075
23. Drink	0.068	0.063	0.055	0.057	0.074
26. Chemicals	0.121	0.138	0.115	0.121	0.119
31. Metal Manufacture	0.118	0.132	0.104	0.116	0.118
33. Non-electrical Eng.	0.104	0.111	0.103	0.089	0.074
36. Electrical Engineering	0.103	0.153	0.134	0.115	0.092
38. Vehicles	0.147	0.139	0.122	0.147	0.111
39. Metal Goods, n.e.s.	0.099	0.122	0.082	0.083	0.078
41. Textiles	0.105	0.130	0.111	0.084	0.074
44. Clothing, Footwear	0.077	0.050	0.094	0.067	0.071
46. Bricks, etc.	0.119	0.145	0.116	0.092	0.087
47. Timber, etc.	0.113	0.120	0.099	0.114	0.115
48. Paper, Printing, etc.	0.115	0.107	0.105	0.087	0.066
49. Other Manufacturing	0.132	0.116	0.114	0.109	0.109
50. Construction	0.150	0.153	0.154	0.143	0.159
81. Wholesale Distribution	0.129	0.132	0.142	0.106	0.105
82. Retail Distribution	0.095	0.109	0.087	0.070	0.072
88. Misc. Services	0.080	0.124	0.122	0.101	0.124
ALL INDUSTRIES (pooled)	0.109	0.121	0.110	0.098	0.093

Table G.I

Simple Correlation of Sales with Disposable Retentions

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.486	0.171	0.100	0.403	0.384
23. Drink	0.006	0.019	0.198	-0.335	-0.173
26. Chemicals	0.482	0.446	0.007	0.086	-0.225
31. Metal Manufacture	0.443	0.118	0.550	-0.127	-0.279
33. Non-electrical Eng.	0.161	0.502	0.643	0.249	0.240
36. Electrical Engineering	0.111	0.288	0.275	0.251	0.047
38. Vehicles	0.200	0.558	0.461	0.373	0.194
39. Metal Goods, n.e.s.	0.347	0.083	-0.111	-0.154	0.004
41. Textiles	0.103	-0.053	-0.055	-0.137	0.274
44. Clothing, Footwear	0.479	0.726	0.642	0.403	0.539
46. Bricks, etc.	0.202	0.653	0.416	0.199	0.051
47. Timber, etc.	0.308	0.335	0.089	-0.124	-0.121
48. Paper, Printing, etc.	0.322	0.484	0.297	0.196	0.159
49. Other Manufacturing	0.053	0.526	0.393	0.083	0.188
50. Construction	-0.108	0.048	0.158	-0.093	-0.075
81. Wholesale Distribution	0.109	-0.073	-0.006	-0.214	0.017
82. Retail Distribution	0.226	0.618	0.536	0.299	0.238
88. Misc. Services	0.148	0.182	0.097	0.425	0.343

Note: These correlations were performed with zero values of sales (some 16% of the population in 1967); so the value of the correlation coefficient is likely to be understated for 1967.

Table G.J

Simple Correlation of Investment with Age Indicator

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	-0.127	-0.269	0.219	-0.080	-0.248
23. Drink	0.054	0.049	0.165	0.322*	0.106
26. Chemicals	-0.013	-0.084	0.248*	0.381*	-0.023
31. Metal Manufacture	-0.272*	0.127	-0.038	-0.238	-0.230
33. Non-electrical Eng.	-0.065	-0.024	-0.073	-0.243*	0.106
36. Electrical Engineering	0.100	-0.097	-0.091	-0.022	0.169
38. Vehicles	-0.116	-0.258	0.084	-0.165	-0.079
39. Metal Goods, n.e.s.	-0.060	-0.051	0.174	0.190	0.240*
41. Textiles	-0.242*	-0.402*	-0.211*	-0.038	0.060
44. Clothing, Footwear	0.137	0.261	0.193	0.147	0.142
46. Bricks, etc.	-0.326*	-0.592	-0.288*	-0.071	-0.311*
47. Timber, etc.	-0.117	0.345*	0.104	-0.271	-0.249
48. Paper, Printing, etc.	-0.034	0.029	0.029	0.152	0.149
49. Other Manufacturing	0.010	0.028	0.044	-0.136	-0.211
50. Construction	0.354*	0.124	0.130	-0.105	-0.165
81. Wholesale Distribution	-0.217*	-0.148	0.003	0.126	-0.137
82. Retail Distribution	0.105	0.178	0.306*	0.199*	0.075
88. Misc. Services	0.116	0.097	-0.132	0.067	-0.002

* Denotes significant difference from zero at 5% level.

Table G.K

Simple Correlation of Investment with
Capacity Utilisation Indicator

YEAR: INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.552*	0.473*	-0.169	0.225	-0.045
23. Drink	0.232	-0.121	0.286*	0.004	0.178
26. Chemicals	0.478*	0.274*	0.238*	0.389*	0.124
31. Metal Manufacture	0.566*	0.220	0.227	0.253	-0.084
33. Non-electrical Eng.	0.155	0.321*	0.203*	0.125	0.228*
36. Electrical Engineering	-0.038	0.409*	0.109	0.141	0.336*
38. Vehicles	0.281	0.089	0.309*	0.058	-0.198
39. Metal Goods, n.e.s.	0.510*	0.314*	0.447*	0.255*	0.068
41. Textiles	0.201	0.078	-0.036	0.180	0.252*
44. Clothing, Footwear	0.640	-0.002	0.332*	0.099	-0.346*
46. Bricks, etc.	-0.012	0.334*	-0.061	-0.031	0.030
47. Timber, etc.	0.262	0.377*	0.297*	0.481*	0.291
48. Paper, Printing, etc.	0.426*	-0.019	0.135	0.266*	0.180
49. Other Manufacturing	-0.198	0.253	0.306*	0.317*	0.245
50. Construction	0.371	0.331*	0.327*	0.263*	-0.014
81. Wholesale Distribution	0.052	0.038	0.031	0.257*	0.002
82. Retail Distribution	0.157	0.127	0.004	-0.045	0.139
88. Misc. Services	0.088	0.267*	0.070	0.206	0.162

* Denotes significant difference from zero at 5% level.

Companies with zero values for sales were

Table G.L

Simple Correlation of Investment with Sales

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.059	0.436*	0.347*	0.533*	-0.251
23. Drink	0.156	0.230	0.417*	0.499*	0.127
26. Chemicals	0.393	0.432*	-0.087	0.216	0.025
31. Metal Manufacture	0.154	0.515*	0.446*	0.448*	0.126
33. Non-electrical Eng.	0.253	0.383*	0.399*	0.233*	0.191*
36. Electrical Engineering	0.203	0.387*	0.191	0.331*	-0.029
38. Vehicles	0.592*	0.361*	0.318*	0.464*	0.389*
39. Metal Goods, n.e.s.	0.423*	0.380*	0.216*	0.226*	0.058
41. Textiles	0.410*	0.384*	0.179	0.183	0.163
44. Clothing, Footwear	0.396	0.471*	0.663*	0.383*	0.527*
46. Bricks, etc.	0.272	0.654*	0.432*	0.418*	0.311*
47. Timber, etc.	-0.062	0.397*	0.354*	0.040	-0.225
48. Paper, Printing, etc.	0.635*	0.378*	0.492*	0.225*	0.056
49. Other Manufacturing	0.077	0.359*	0.280*	0.580*	0.357*
50. Construction	0.001	-0.158	0.340*	0.228*	0.399*
81. Wholesale Distribution	0.074	-0.053	0.139	-0.077	0.175
82. Retail Distribution	0.613*	0.455*	0.400*	0.329*	0.131
88. Misc. Services	0.162	0.248*	0.071	0.094	-0.038

* Denotes significant difference from zero at 5% level.

Companies with zero value for sales were omitted from the correlations for that year.

Table G.M

Simple Correlation of Investment with Change in Sales

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.071	0.579*	0.495*	0.478*	0.086
23. Drink	0.389	0.349	0.451*	0.037	0.365*
26. Chemicals	0.351	0.441*	-0.087	0.186	0.341*
31. Metal Manufacture	0.285	0.284	0.459*	0.351*	0.063
33. Non-electrical Eng.	0.125	0.257*	0.474*	-0.003	0.322*
36. Electrical Engineering	0.504*	0.354*	0.192	0.209	0.317*
38. Vehicles	0.610*	0.437*	0.446*	0.299	-0.124
39. Metal Goods, n.e.s.	0.640*	0.376*	0.457*	0.617*	0.155
41. Textiles	0.303	0.283*	0.069	0.393*	0.364
44. Clothing, Footwear	0.127	0.206	0.483*	0.515*	0.396*
46. Bricks, etc.	0.289	0.380*	0.413*	0.577*	0.612*
47. Timber, etc.	0.281	0.611*	0.579*	0.530*	0.522*
48. Paper, Printing, etc.	0.555*	0.240	0.694*	0.290*	0.414*
49. Other Manufacturing	0.457	0.633*	0.555*	0.484*	0.345*
50. Construction	-0.046	0.082	0.171	0.317*	0.390*
81. Wholesale Distribution	0.358*	0.249*	0.234*	0.217*	0.389*
82. Retail Distribution	0.247	0.474*	0.469*	0.466*	0.389*
88. Misc. Services	0.296	0.314	0.271*	0.304*	0.067

* Denotes significant difference from zero at 5% level.

Companies with zero values for sales for the current or previous year were omitted from the correlations for that year.

Table G.N

Simple Correlation of Investment with Disposable Retentions

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.485*	0.548*	0.481*	0.815*	-0.498*
23. Drink	0.177	0.181	0.284*	-0.006	0.301*
26. Chemicals	0.634*	0.561*	-0.107	0.578*	0.344*
31. Metal Manufacture	0.594*	0.302*	0.465*	0.147	0.296*
33. Non-electrical Eng.	0.475*	0.434*	0.529*	0.215*	0.292*
36. Electrical Engineering	0.070	0.406*	0.318*	0.198	0.266*
38. Vehicles	0.704*	0.660*	0.685*	0.480*	0.272
39. Metal Goods, n.e.s.	0.439*	0.332*	0.437*	0.379*	0.385*
41. Textiles	0.631*	0.318*	0.331*	0.384*	0.457*
44. Clothing, Footwear	0.540*	0.480*	0.724*	0.318*	0.528*
46. Bricks, etc.	0.768*	0.689*	0.748*	0.384*	0.456*
47. Timber, etc.	0.097	0.712*	0.557*	0.370*	0.561*
48. Paper, Printing, etc.	0.567*	0.476*	0.661*	0.512*	0.520*
49. Other Manufacturing	0.103	0.352*	0.335*	0.375*	0.553*
50. Construction	0.313*	0.149	0.595*	0.374*	0.254*
81. Wholesale Distribution	0.308*	0.112	0.216*	0.389*	0.619*
82. Retail Distribution	0.347*	0.323*	0.141	0.354*	0.542*
88. Misc. Services	0.113	0.023	0.106	0.340*	0.303*

* Denotes significant difference from zero at 5% level.

Table G.O

Simple Correlation of Investment with Depreciation

YEAR: INDUSTRY	1967	1968	1969	1970	1971
21. Food	0.606*	0.591*	0.336*	0.787*	-0.570*
23. Drink	0.407*	0.324*	0.448*	0.571*	0.586*
26. Chemicals	0.642*	0.672*	0.472*	0.157	0.208
31. Metal Manufacture	0.719*	0.548*	0.577*	0.472*	0.390*
33. Non-electrical Eng.	0.511*	0.566*	0.358*	0.346*	0.359*
36. Electrical Engineering	0.433*	0.508*	-0.018	0.342*	0.356*
38. Vehicles	0.705*	0.310*	0.642*	0.168	0.440*
39. Metal Goods, n.e.s.	0.607*	0.607*	0.602*	0.056	0.544*
41. Textiles	0.698*	0.684*	0.587*	0.235*	0.529*
44. Clothing, Footwear	0.571*	0.637*	0.791*	0.408*	0.647*
46. Bricks, etc.	0.268*	0.584*	0.422*	0.486*	0.332*
47. Timber, etc.	0.359*	0.608*	0.528*	0.308*	0.109
48. Paper, Printing, etc.	0.580*	0.624*	0.351*	0.490*	-0.039
49. Other Manufacturing	0.718*	0.709*	0.503*	0.503*	0.415*
50. Construction	0.614*	0.503*	0.664*	0.259*	0.574*
81. Wholesale Distribution	0.484*	0.388*	0.488*	0.490*	0.515*
82. Retail Distribution	0.607*	0.550*	0.496*	0.246*	0.176
88. Misc. Services	0.481*	0.498*	0.391*	0.617*	0.536*

* Denotes significant difference from zero at 5% level.

Table G.P

Simple Correlation of Investment with
Net Liquidity Balances

YEAR INDUSTRY	1967	1968	1969	1970	1971
21. Food	-0.249	-0.193	0.317*	0.482*	-0.110
23. Drink	-0.330*	-0.188	-0.163	-0.127	-0.057
26. Chemicals	-0.155	-0.210	0.041	0.242*	-0.022
31. Metal Manufacture	-0.044	-0.066	0.112	0.221	-0.057
33. Non-electrical Eng.	-0.011	-0.081	0.028	-0.069	0.147
36. Electrical Engineering	-0.278*	0.021	0.069	-0.210	-0.163
38. Vehicles	0.419*	-0.019	-0.219	-0.204	0.248
39. Metal Goods, n.e.s.	0.191	0.112	0.254*	-0.238*	0.145
41. Textiles	-0.212*	0.233*	0.049	0.169	-0.123
44. Clothing, Footwear	-0.425*	0.142	-0.391*	0.058	-0.236
46. Bricks, etc.	-0.198	0.114	-0.179	-0.418*	-0.319*
47. Timber, etc.	0.312*	-0.114	-0.294	-0.085	0.306*
48. Paper, Printing, etc.	0.245*	0.106	0.146	0.196	0.063
49. Other Manufacturing	-0.325*	-0.303*	-0.034	-0.018	0.084
50. Construction	0.390*	-0.019	0.341*	-0.068	-0.142
81. Wholesale Distribution	-0.217*	-0.222*	-0.266*	-0.175	-0.088
82. Retail Distribution	-0.162	-0.189*	-0.306*	-0.057	-0.114
88. Misc. Services	-0.083	-0.239*	-0.119	0.012	0.165

* Denotes significant difference from zero at 5% level.

Table G.Q

Multiple Regression Results : 1967

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase
+ f Retentions + g Depreciation + h Liquidity
+ residual

INDUSTRY	Food	Drink	Chemicals	Metal Mfr.	Non-e. Eng.	Elec. Eng.
a	0.197	-0.017	-0.228	-0.167	-0.004	0.038
b	-0.056	-0.502	0.013	-0.058	-0.101	-0.088
S_b	0.148	0.205	0.136	0.176	0.100	0.111
c	0.098	0.097	0.282	0.189	0.002	0.018
S_c	0.062	0.113	0.090	0.104	0.069	0.087
d	-0.007	-0.010	0.001	-0.002	0.003	-0.004
S_d	0.006	0.010	0.007	0.009	0.007	0.007
e	-0.044	-0.024	-0.123	-0.058	0.012	0.094
S_e	0.057	0.072	0.107	0.064	0.035	0.055
f	0.321	-0.421	0.576	0.293	0.363	0.009
S_f	0.215	0.269	0.252	0.212	0.097	0.130
g	4.203	3.909	1.002	2.575	1.857	0.976
S_g	1.205	1.666	0.453	1.017	0.680	0.480
h	-0.002	0.028	-0.124	-0.038	0.028	-0.049
S_h	0.074	0.042	0.069	0.074	0.049	0.052
R^2	0.792	0.670	0.678	0.736	0.438	0.525

S is the standard deviation of the respective coefficient.

Table G.Q (cont.)

Multiple Regression Results: 1967

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase
+ f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Vehicles	Metal Goods	Tex-tiles	Clothing, etc.	Bricks, etc.	Timber, etc.
a	-0.053	-0.109	-0.119	0.515	0.214	0.066
b	0.457	-0.161	0.273	-0.657	-0.314	-0.394
S_b	0.397	0.114	0.189	0.411	0.118	0.148
c	-0.286	0.077	0.038	-0.521	-0.081	0.090
S_c	0.204	0.074	0.070	0.869	0.065	0.116
d	-0.002	0.014	0.013	-0.006	0.022	0.034
S_d	0.015	0.015	0.009	0.051	0.006	0.015
e	0.004	0.206	0.022	-1.540	0.134	-0.057
S_e	0.079	0.073	0.071	0.954	0.061	0.109
f	1.438	-0.338	0.790	3.575	0.630	-0.830
S_f	0.601	0.204	0.239	1.837	0.196	0.286
g	1.557	3.839	-0.348	2.268	-0.379	1.631
S_g	0.994	1.248	1.276	4.883	0.709	0.763
h	-0.081	0.027	-0.191	-0.844	0.100	0.124
S_h	0.151	0.069	0.099	0.570	0.051	0.049
R^2	0.863	0.703	0.521	0.794	0.758	0.776

S is the standard deviation of the respective coefficient.

Table G.Q (cont.)

Multiple Regression Results : 1967

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase
+ f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Paper, etc.	Other Mfg.	Constr-uction	W'sale Distn.	Retail Distn.	Misc. Servs.
a	0.013	0.074	-0.375	0.053	-0.048	0.012
b	0.018	0.136	0.279	-0.337	-0.299	-0.195
S_b	0.137	0.105	0.371	0.180	0.136	0.127
c	0.057	-0.121	0.265	-0.008	0.043	0.060
S_c	0.086	0.099	0.211	0.085	0.071	0.079
d	0.050	0.011	0.021	-0.001	0.014	0.003
S_d	0.014	0.016	0.016	0.007	0.006	0.005
e	0.283	0.032	0.149	0.063	-0.014	0.088
S_e	0.077	0.158	0.131	0.057	0.054	0.075
f	-0.559	0.498	-0.095	0.369	-0.047	-0.155
S_f	0.219	0.205	0.278	0.213	0.116	0.223
g	-0.497	0.299	0.627	2.260	2.950	1.333
S_g	0.716	1.527	1.040	0.852	0.756	0.353
h	0.177	-0.043	0.143	-0.039	0.018	0.074
S_h	0.058	0.070	0.186	0.066	0.056	0.096
R^2	0.691	0.839	0.461	0.413	0.547	0.540

S is the standard deviation of the respective coefficient.

Table G.R

Multiple Regression Results : 1968

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase
+ f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Food	Drink	Chemi-cals	Metal Mfr.	Non-e. Eng.	Elect. Eng.
a	-0.202	0.093	-0.251	-0.197	-0.144	-0.105
b	-0.117	-0.113	-0.074	0.171	-0.080	-0.430
S_b	0.108	0.123	0.160	0.188	0.090	0.138
c	0.188	-0.034	0.234	0.158	0.117	0.245
S_c	0.051	0.061	0.111	0.104	0.063	0.101
d	-0.001	-0.009	0.006	0.023	0.007	0.002
S_d	0.004	0.008	0.009	0.010	0.006	0.006
e	0.122	0.205	0.081	-0.020	-0.018	0.085
S_e	0.046	0.109	0.114	0.098	0.037	0.080
f	0.595	-0.196	0.121	0.504	0.365	0.246
S_f	0.198	0.313	0.221	0.193	0.111	0.135
g	2.513	0.924	2.272	0.501	2.575	1.851
S_g	0.724	0.802	0.479	0.279	0.493	0.407
h	-0.013	-0.035	0.105	0.011	-0.037	-0.095
S_h	0.044	0.044	0.075	0.062	0.042	0.053
R^2	0.817	0.240	0.594	0.565	0.473	0.616

S is the standard deviation of the respective coefficient.

Table G.R (cont.)

Multiple Regression Results : 1968

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase
+ f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Vehicles	Metal Goods	Tex-tiles	Clothing, etc.	Bricks, etc.	Timber, etc.
a	0.277	-0.043	0.173	-0.209	0.143	-0.180
b	0.011	-0.197	-0.359	0.029	-0.404	0.427
S_b	0.228	0.092	0.112	0.096	0.146	0.255
c	-0.255	0.078	-0.040	0.220	0.004	-0.121
S_c	0.178	0.069	0.061	0.100	0.098	0.174
d	-0.010	0.017	0.014	-0.010	0.014	-0.015
S_d	0.021	0.006	0.006	0.010	0.010	0.011
e	0.286	0.014	-0.021	-0.007	-0.040	0.198
S_e	0.200	0.049	0.048	0.071	0.080	0.132
f	0.547	0.499	0.197	0.177	0.828	1.402
S_f	0.488	0.102	0.136	0.155	0.207	0.313
g	-0.181	1.937	1.865	2.418	1.609	2.395
S_g	0.855	0.556	0.440	0.579	0.437	1.090
h	-0.002	-0.006	0.060	0.139	0.142	-0.185
S_h	0.130	0.040	0.037	0.048	0.079	0.098
R^2	0.418	0.659	0.606	0.739	0.778	0.775

S is the standard deviation of the respective coefficient.

Table G.R (cont.)

Multiple Regression Results : 1968

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase
+ f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Paper, etc.	Other Mfg.	Construction	W'sale Distn.	Retail Distn.	Misc. Servs.
a	0.021	-0.114	-0.114	0.061	-0.139	-0.258
b	-0.067	0.009	0.107	-0.230	-0.235	-0.139
S_b	0.128	0.139	0.186	0.158	0.143	0.223
c	0.036	0.186	0.158	0.016	0.126	0.317
S_c	0.073	0.107	0.095	0.087	0.112	0.142
d	-0.010	-0.005	-0.020	-0.008	0.013	0.002
S_d	0.019	0.010	0.008	0.006	0.007	0.013
e	0.064	0.187	0.090	0.102	0.172	0.023
S_e	0.081	0.089	0.066	0.065	0.084	0.175
f	0.193	0.446	0.597	0.307	-0.229	1.119
S_f	0.254	0.412	0.243	0.179	0.168	0.686
g	1.178	-0.010	1.273	2.013	2.303	1.787
S_g	0.809	1.299	0.511	0.581	0.623	0.678
h	0.106	-0.119	-0.130	-0.021	0.015	-0.213
S_h	0.068	0.089	0.083	0.061	0.056	0.173
R^2	0.269	0.577	0.442	0.270	0.404	0.426

S is the standard deviation of the respective coefficient.

Table G.S

Multiple Regression Results : 1969

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase
+ f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Food	Drink	Chemicals	Metal Mfr.	Non-e. Eng.	Elec. Eng.
a	-0.025	-0.053	-0.230	-0.097	0.104	0.101
b	0.157	-0.075	0.143	0.146	0.000	-0.100
S_b	0.219	0.086	0.174	0.209	0.067	0.135
c	-0.014	0.091	0.173	-0.034	-0.056	0.040
S_c	0.143	0.059	0.094	0.105	0.052	0.101
d	0.015	0.005	-0.011	0.001	-0.001	0.003
S_d	0.011	0.005	0.010	0.011	0.005	0.008
e	0.089	0.069	-0.064	0.191	0.103	-0.032
S_e	0.119	0.063	0.094	0.083	0.027	0.097
f	0.807	0.234	-0.219	0.211	0.367	0.323
S_f	0.490	0.221	0.195	0.390	0.097	0.161
g	0.821	0.653	2.923	1.701	0.309	0.328
S_g	1.726	0.349	0.686	4.151	0.282	0.287
h	0.128	0.016	-0.010	0.036	-0.007	0.012
S_h	0.096	0.041	0.095	0.086	0.028	0.063
R^2	0.495	0.362	0.393	0.449	0.383	0.144

S is the standard deviation of the respective coefficient.

Table G.S (cont.)

Multiple Regression Results : 1969

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase + f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Vehicles	Metal Goods	Tex-tiles	Clothing, etc.	Bricks, etc.	Timber, etc.
a	-0.111	-0.210	-0.026	-0.117	0.011	-0.074
b	0.346	0.023	-0.082	0.095	-0.119	0.018
S_b	0.181	0.100	0.108	0.104	0.107	0.109
c	-0.197	0.133	0.007	0.103	-0.016	0.019
S_c	0.169	0.060	0.055	0.150	0.057	0.091
d	-0.002	0.006	0.005	-0.001	0.000	-0.003
S_d	0.010	0.010	0.005	0.008	0.010	0.007
e	0.230	0.097	-0.072	0.102	-0.092	0.021
S_e	0.078	0.047	0.039	0.057	0.059	0.050
f	0.898	0.493	0.462	0.306	1.471	0.488
S_f	0.191	0.201	0.157	0.166	0.234	0.118
g	3.370	2.395	2.744	0.768	2.159	2.274
S_g	0.928	0.565	0.470	0.331	0.563	0.556
h	0.082	0.071	0.036	-0.095	-0.007	-0.101
S_h	0.106	0.047	0.048	0.053	0.059	0.057
R^2	0.774	0.584	0.462	0.783	0.717	0.726

S is the standard deviation of the respective coefficient.

Table G.S (cont.)

Multiple Regression Results : 1969

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase + f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Paper, etc.	Other Mfg.	Constr-uction	W'sale Distn.	Retail Distn.	Misc. Servs.
a	-0.010	-0.072	0.011	0.066	-0.096	0.066
b	-0.071	0.043	-0.164	-0.117	0.038	-0.357
S_b	0.110	0.149	0.125	0.093	0.116	0.126
c	0.002	0.006	0.030	-0.027	0.070	0.056
S_c	0.059	0.078	0.065	0.064	0.076	0.083
d	0.009	-0.016	0.007	0.002	0.007	-0.005
S_d	0.014	0.010	0.004	0.003	0.006	0.007
e	0.236	0.192	-0.035	0.035	0.140	0.145
S_e	0.078	0.069	0.032	0.029	0.060	0.097
f	0.614	0.193	0.369	0.122	-0.181	0.126
S_f	0.176	0.140	0.167	0.099	0.110	0.233
g	0.998	2.908	1.642	1.538	1.229	1.505
S_g	0.465	0.988	0.327	0.374	0.523	0.430
h	-0.069	0.006	0.075	-0.047	-0.049	0.044
S_h	0.052	0.076	0.059	0.034	0.050	0.088
R^2	0.638	0.523	0.626	0.338	0.389	0.336

S is the standard deviation of the respective regression coefficient.

Table G.T

Multiple Regression Results : 1970

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase + f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Food	Drink	Chemi-cals	Metal Mfr.	Non-e Eng.	Elect. Eng.
a	0.172	-0.023	-0.265	0.020	0.030	-0.111
b	-0.010	-0.148	0.416	-0.189	-0.160	0.014
S_b	0.079	0.063	0.200	0.153	0.079	0.090
c	-0.159	0.037	0.151	0.053	0.062	0.141
S_c	0.114	0.029	0.099	0.060	0.051	0.059
d	0.002	0.013	0.014	0.020	0.007	0.010
S_d	0.005	0.004	0.011	0.007	0.005	0.005
e	0.132	-0.021	-0.050	0.049	-0.048	-0.085
S_e	0.058	0.026	0.091	0.041	0.030	0.059
f	0.689	0.128	0.657	0.175	0.211	0.281
S_f	0.187	0.122	0.166	0.145	0.099	0.084
g	0.733	2.055	0.617	1.205	1.044	0.864
S_g	0.437	0.473	0.820	0.577	0.287	0.177
h	0.164	0.064	-0.050	0.189	0.015	-0.077
S_h	0.050	0.028	0.109	0.057	0.034	0.043
R^2	0.860	0.533	0.497	0.590	0.234	0.455

S is the standard deviation of the respective regression coefficient.

Table G.T (cont.)

Multiple Regression Results : 1970

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase + f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Vehicles	Metal Goods	Tex-tiles	Clothing, etc.	Bricks, etc.	Timber, etc.
a	-0.009	-0.089	0.002	-0.115	-0.091	-0.131
b	-0.066	0.109	-0.064	0.051	-0.027	-0.460
S_b	0.223	0.096	0.142	0.190	0.166	0.180
c	0.063	0.049	0.046	0.077	0.026	0.233
S_c	0.163	0.050	0.059	0.152	0.079	0.131
d	0.014	0.007	0.009	0.011	0.001	0.008
S_d	0.011	0.008	0.006	0.014	0.016	0.012
e	0.011	0.198	0.035	0.126	0.164	0.076
S_e	0.114	0.056	0.042	0.090	0.085	0.077
f	0.387	0.318	0.351	0.180	0.213	0.344
S_f	0.174	0.113	0.112	0.259	0.263	0.179
g	1.182	0.123	0.993	1.690	1.620	2.941
S_g	0.738	0.501	0.329	1.221	0.666	1.023
h	0.052	-0.043	0.048	0.151	-0.198	-0.010
S_h	0.108	0.045	0.059	0.108	0.096	0.110
R^2	0.409	0.481	0.354	0.417	0.519	0.595

S is the standard deviation of the respective regression coefficient.

Table G.T (cont.)

Multiple Regression Results : 1970

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase + f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Paper, etc.	Other Mfg.	Constr-uction	W'sale Distn.	Retail Distn.	Misc. Servs.
a	-0.120	-0.060	0.044	-0.142	0.045	0.011
b	-0.118	-0.337	-0.343	0.026	0.134	-0.109
S_b	0.123	0.183	0.146	0.135	0.083	0.091
c	0.159	0.136	0.112	0.132	-0.074	0.047
S_c	0.064	0.145	0.074	0.070	0.081	0.074
d	-0.016	0.021	0.007	-0.004	0.004	-0.006
S_d	0.020	0.013	0.005	0.005	0.004	0.006
e	0.106	0.062	-0.003	0.043	0.140	0.067
S_e	0.102	0.111	0.040	0.039	0.035	0.061
f	0.457	0.187	0.302	0.272	0.141	0.299
S_f	0.114	0.117	0.090	0.129	0.088	0.175
g	1.924	1.470	1.087	2.213	0.355	1.349
S_g	0.587	0.775	0.366	0.613	0.293	0.281
h	0.009	0.034	-0.036	-0.031	0.034	0.022
S_h	0.066	0.105	0.047	0.046	0.041	0.073
R^2	0.492	0.545	0.391	0.396	0.375	0.494

S is the standard deviation of the respective regression coefficient.

Table G.U

Multiple Regression Results : 1971

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase + f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Food	Drink	Chemi-cals	Metal Mfr.	Non-e Eng.	Elect. Eng.
a	0.290	-0.117	0.065	0.099	-0.073	-0.110
b	-0.084	-0.401	-0.193	-0.149	0.140	0.076
S_b	0.170	0.132	0.192	0.204	0.086	0.128
c	-0.118	0.139	0.008	-0.029	-0.008	0.104
S_c	0.171	0.069	0.075	0.066	0.051	0.078
d	-0.005	0.007	-0.015	0.012	0.009	-0.011
S_d	0.008	0.010	0.010	0.009	0.006	0.007
e	0.148	-0.039	0.093	0.002	0.055	0.087
S_e	0.126	0.097	0.064	0.056	0.033	0.070
f	-0.044	0.140	0.311	0.267	0.116	0.254
S_f	0.273	0.145	0.125	0.146	0.077	0.116
g	-1.738	4.375	1.789	1.164	1.368	0.896
S_g	1.100	0.792	0.713	0.824	0.387	0.411
h	-0.016	0.041	-0.082	0.084	0.053	-0.119
S_h	0.092	0.058	0.087	0.070	0.040	0.061
R^2	0.408	0.565	0.308	0.263	0.255	0.368

S is the standard deviation of the respective regression coefficient.

Table G.U (cont.)

Multiple Regression Results : 1971

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase
+ f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Vehicles	Metal Gds.	Tex-tiles	Clothing, etc.	Bricks, etc.	Timber, etc.
a	-0.001	-0.056	-0.083	0.057	0.072	0.292
b	-0.200	0.035	0.161	-0.031	-0.080	-0.265
S_b	0.237	0.081	0.096	0.109	0.122	0.209
c	-0.048	-0.032	0.020	-0.085	-0.046	-0.211
S_c	0.167	0.043	0.031	0.074	0.050	0.151
d	0.009	-0.001	-0.001	0.005	-0.001	-0.018
S_d	0.014	0.007	0.004	0.009	0.011	0.012
e	-0.111	-0.035	0.028	0.013	0.127	0.246
S_e	0.097	0.034	0.024	0.066	0.057	0.081
f	0.323	0.409	0.270	0.139	0.333	0.284
S_f	0.155	0.102	0.087	0.161	0.193	0.317
g	2.892	2.739	1.061	1.526	0.585	1.879
S_g	1.055	0.493	0.364	0.549	0.446	1.187
h	-0.077	0.076	-0.040	0.003	-0.056	0.177
S_h	0.149	0.038	0.034	0.078	0.060	0.112
R^2	0.437	0.484	0.421	0.555	0.491	0.575

S is the standard deviation of the respective regression coefficient.

Table G.U (cont.)

Multiple Regression Results : 1971

Investment = a + b Age + c Utilisation + d Sales + e Sales Increase
+ f Retentions + g Depreciation + h Liquidity + residual

INDUSTRY	Paper, etc.	Other Mfg.	Constr- uction	W'sale Distn.	Retail Distn.	Misc. Servs.
a	0.077	-0.030	0.093	0.055	0.007	0.101
b	0.161	-0.194	0.083	-0.159	0.201	-0.322
S_b	0.103	0.166	0.141	0.121	0.092	0.137
c	-0.093	0.067	-0.239	-0.047	-0.025	0.037
S_c	0.055	0.089	0.088	0.065	0.084	0.091
d	-0.012	0.023	0.008	0.004	-0.009	-0.004
S_d	0.014	0.011	0.006	0.004	0.005	0.008
e	0.176	-0.036	0.143	0.022	0.117	-0.055
S_e	0.063	0.088	0.061	0.036	0.043	0.078
f	0.354	0.310	0.107	0.376	0.461	0.223
S_f	0.128	0.167	0.111	0.078	0.086	0.191
g	-0.117	1.639	1.253	1.449	0.279	1.697
S_g	0.498	0.657	0.235	0.363	0.149	0.366
h	-0.021	0.083	-0.058	0.004	-0.053	0.116
S_h	0.051	0.084	0.053	0.038	0.046	0.092
R^2	0.394	0.500	0.548	0.547	0.437	0.435

S is the standard deviation of the respective regression coefficient.

APPENDIX H.

TABLE H.A.

The standardised profitability of amalgamations, before and after merger

	All cases			Extremes Removed				
	Raw Profitability			Raw Profitability		Adjusted Profitability		
Year	R_z	S_{rz}	n	R_z	S_{rz}	F_z	S_{fz}	n
y-3	1.208	3.198	233	1.057	0.263	1.057	0.263	213
y-2	1.340	6.717	233	1.119	0.267	1.119	0.267	213
y-1	1.165	0.542	233	1.138	0.219	1.138	0.219	213
y	1.276	1.143	233	1.218	0.296	1.252	0.322	213
y+1	1.088	0.603	211	1.055	0.312	1.094	0.343	192
y+2	0.738	10.422	191	1.064	0.268	1.088	0.287	174
y+3	0.877	1.868	161	1.042	0.340	1.053	0.347	146
y+4	1.095	3.854	113	0.994	0.327	0.995	0.323	103
y+5	0.781	1.175	73	0.928	0.314	0.927	0.312	67
y+6	0.823	0.551	50	0.959	0.313	0.961	0.315	44
y+7	0.966	0.451	23	0.999	0.457	0.998	0.458	21

Notes:

See chapter 7, section c. for full definitions.

R is raw profitability as a proportion of profitability for the industry-year.

F is adjusted profitability as a proportion of profitability for the industry-year.

S is the standard deviation.

n is the number of cases surviving to that year, and incorporated in the averages.

TABLE H.B.

The average rate of growth by acquisition of subsidiaries and the average rate of profit: by industry, 1964-71.

Industry		Number of companies	% per annum Rate of growth by acquisition	Rate of profit
10	Mixed Activities	1	6.6	10.3
21	Food	30	7.1	16.2
23	Drink	47	2.5	15.1
24	Tobacco	4	3.4	17.3
26	Chemicals	48	6.2	19.0
31	Metal Manufacture	42	4.0	18.4
33	Non-electrical Engineering	110	3.9	15.7
36	Electrical Engineering	50	5.8	18.8
37	Shipbuilding	7	2.1	6.8
38	Vehicles	27	4.7	19.4
39	Metal Goods, n.e.s.	68	4.1	19.1
41	Textiles	69	4.0	14.9
43	Leather, etc.	7	7.3	17.1
44	Clothing and Foot-wear	31	5.8	18.2
46	Bricks, Pottery, etc.	40	7.1	16.8
47	Timber, etc.	31	2.9	19.5
48	Paper, Printing etc.	55	4.4	15.1
49	Other Manufacturing	38	4.4	19.3
50	Construction	49	7.7	20.1
70	Transport	16	3.7	16.0
81	Wholesale Distribution	71	5.0	19.2
82	Retail Distribution	79	3.1	19.6
88	Miscellaneous Services	46	9.0	16.1
All companies		966	4.9	17.5

Notes:

For detailed definitions see appendix F.

Only companies which continued in independent existence within the population are included.

Survey of earlier work on the impact of merger on company performance.

Of the three earlier studies which incorporate profitability as a success criterion, Singh's (1971) is closest in method to that reported here (the method used was in part modelled on his). He asks what proportion of his sample of 77 acquiring companies performed less well after the merger than did the two participants prior to the merger. In fact a majority showed a decline in profitability. The chief drawbacks of the work are that it considers records for only 2 years after merger; that it gives no estimate of the typical decline in profitability; and that the results are now becoming rather old (they relate to the nineteen-fifties: see Table H.C. for a summary of the coverage and results of earlier studies). Its results do, however, closely resemble those produced in chapter 7 for more recent years; moreover, the pattern he found for the immediate post-merger years is found to persist over longer periods.

A study for the United States (Lev and Mandelker, 1972) and one for Britain (Utton, 1974) both match acquisitive (active in takeover) with non-acquisitive companies of similar size and (in the former case only) from the same industry. The former study finds little difference in the profitability records of the two groups; while Utton reports that the merging companies were markedly inferior on this criterion. That neither study made allowance for the accounting bias discussed in appendix D represents a serious objection to these conclusions. In addition, Utton himself points out that he made no allowance for the influence of industry on his samples of acquiring and non-acquiring firms: this casts some further doubt on his conclusions, given the small size of his sample (39 companies), and the

TABLE H.C.

Summary of earlier work on the relationship between merger and performance.

The performance variable relates to the acquiring company except where stated. The study is for the United States except where stated.

Author	Period	Sample Size	Yardstick	Performance Measure	Verdict
Singh	1954-60 (U.K.)	77	Participants' earlier profitability, in relation to industry.	Rate of return on net assets.	Unfavourable
Utton	1961-70 (U.K.)	39	Matched sample (with respect to size).	Rate of return on net assets.	Unfavourable
Lev and Mandelker	1947-68	69	Matched sample (with respect to size and industry).	Rates of return on total and on equity assets.	Indecisive
				Dividends plus share price appreciation.	Favourable
Kelly	1946-60	22	Matched sample (with respect to size and industry).	Change in share price.	Indecisive
				Change in price-earnings ratio.	Favourable
				Change in earnings per share.	Unfavourable
Hogarty	1953-64	43	Industry average.	Dividends plus share price increase.	Unfavourable
				Change in earnings per share.	Indecisive
Lorie and Halpern	1955-67	115	Market index.	Victim shareholders' capital appreciation.	Favourable
Ryden	1955-68 (Sweden)	54	Tested for individual industries.	Relation of share price increase to:	
				one acquisition rate;	Positive
				alternative acquisition rate.	Indecisive
Reid	1951-61	478	Tested for individual industries.	Relation to acquisition rate of:	
				change in share price;	Negative
				change in earnings per unit of opening assets;	Negative
				change in earnings per unit of opening sales.	Negative

sizeable differences which exist in industry rates of profit and in the average rate of expansion by takeover in different industries.[1]

Lev and Mandelker also compared the two groups' performance in terms of dividends plus the appreciation in their share price. By contrast with the results for profitability the acquirers achieved superiority according to this criterion. A second study which revealed divergent movements in earnings and in the share price was that of Kelly (1967): he compared the records of 22 merging companies with those of 22 non-merging companies which had been matched with the acquirers on the basis of industry and size. The two groups' share price performed equally well, though the merging companies enjoyed a greater improvement in their price-earnings ratio; necessarily, therefore, the merging companies performed less well in terms of the change in earnings per share. Thus in both these studies it appears that the advantage displayed by the acquirers stemmed from shareholders' bidding up their share price to an extent that was not justified by their current performance.

Three other studies concentrate on a stock market indicator of merging companies' performance. Hogarty (1970) used a common measure of shareholder gains to assess the success of merger, comparing the dividends plus share price appreciation of 43 merging companies with the industry average of the same measure. Only 3 merging companies achieved clear success on this criterion, whilst 21 failed (the rest

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1. Simple averages of rates of profit and of growth by acquisition for the companies within each of 23 2 digit industries are given in Table H.B.

falling in the twilight). A second comparison, using the improvement in earnings per share as the success measure, was quite inconclusive. Lorie and Halpern (1970) examined the capital record of shareholders in a specific set of victim companies: those where the shareholders were paid in "funny money" - e.g. convertible preferred stock, etc. (not cash, common stock and ordinary bonds). They found that capital appreciation for those holders typically outpaced the market index.[2] Finally, Ryden (1972) related the improvement in share price to the acquisition rate for 54 Swedish companies. On one measure of the acquisition rate, he found a positive association, whilst, on another, the association disappeared.

Two difficulties hinder the use of studies which measure success in terms of share price movements in a discussion of the efficiency consequences of merger. Firstly, there is the possibility suggested by the work of Lev and Mandelker and of Kelly that acquiring companies could be valued more highly than their performance would seem to justify - perhaps as the result of some irrational stock market fashion. Secondly, all the studies reviewed here focus on the experience of one partner in the takeover bargain, failing to distinguish the general gains in profitability brought about by the merger from gains or losses associated with the exchange terms between the acquirer's and the victim's shares. In fact, in a particular merger, if the capital market is imperfect, the acquirer's shareholders might lose (as Reid (1968) found),[3] and the victim's gain (as Lorie and Halpern

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2. Jones, Tweedie and Whittington (1975) also found that the shareholders of takeover victims enjoyed above average returns in terms of dividends plus capital appreciation.

3. Reid was concerned with the role of merger in the growth-profitability/

found), whilst the rate of profit on total capital employed was unchanged (as Lev and Mandelker found). Utton's (1974) survey of these papers is therefore misleading in lending equal weight to all the diverse results as if each measure were an equally valid, unambiguous proxy for the profitability, let alone the efficiency, consequences of merger. The three studies which select the rate of profit on total capital are the really useful ones for the issue raised in chapter 7;[4] and these provide support for the finding of chapter 7

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3. Contd.

profitability trade-off hypothesised by the managerial theorists of the firm (and discussed in chapters 8 and 9 of the thesis). He related various growth and earnings measures to the frequency of merger. On the earnings side he measured the proportionate increase in the share price and in profits that could be attributed to the original shareholders. Whether the observations were pooled or segregated by industry, he found a negative association between merger-intensity and these performance measures. At first sight these tests seem to resemble those in part 2 of the thesis, in relating the change in profit to the rate of growth by acquisition; but in fact they too suffer from the problems of those studies using share prices as indeces of performance. For Reid's device for allocating the change in profit to the orginal shareholders means that an unfavourable change in profit on his measurement could be the result not of poor profitability performance but of unfavourable share exchange terms for the acquirer's shareholders (a situation consistent with the evidence of Lorie and Halpern and of Jones, Tweedie and Whittington).

4. This is not to say that the others are not appropriate to other issues - such as the attitude of the stock market to mergers. The aim here is only to suggest that they do not necessarily support the interpretation put on them by Utton.

that merger did not typically result in improvements in profitability.

Three other studies of a different type have reached sceptical conclusions on the efficiency consequences of mergers. Two (Kitching (1967) and Newbould (1970)) are based on interviews with the managers of acquiring companies. Managers typically admitted that negligible gains or else actual losses in efficiency followed many mergers; and Newbould concluded that "managers are the only consistent gainers from mergers" (p.192).[5] Finally, the case study treatment of mergers in particular markets by Hart, Utton and Walshe (1973) also revealed evidence of managerial diseconomies following merger (p.101).

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5. See section 10.b. above on the gains to managers from merger.

APPENDIX I.

TABLE I.A.

The standardised profitability of amalgamations, before and after merger: unadjusted profitability (diversification study).

Year	Same 3 digit			Other 3 digit			Other 2 digit		
	R_z	S_{rz}	n	R_z	S_{rz}	n	R_z	S_{rz}	n
y-3	0.982	0.300	102	1.119	0.244	30	1.128	0.241	81
y-2	1.043	0.265	102	1.128	0.308	30	1.211	0.245	81
y-1	1.062	0.203	102	1.172	0.185	30	1.220	0.242	81
y	1.190	0.295	102	1.153	0.367	30	1.279	0.274	81
y+1	0.982	0.246	92	1.073	0.542	26	1.139	0.310	74
y+2	1.002	0.235	82	0.984	0.309	25	1.169	0.283	67
y+3	0.985	0.291	64	0.824	0.512	22	1.182	0.301	60
y+4	1.004	0.276	48	0.707	0.288	13	1.071	0.380	42
y+5	0.940	0.293	32	0.576	0.231	8	1.018	0.339	27
y+6	0.855	0.302	22				1.036	0.314	21
y+7	1.055	0.342	10				0.953	0.665	10

Notes:

See chapter 7, section c. for full definitions.

R is raw profitability as a proportion of profitability for the industry-year.

S is the standard deviation

n is the number of companies surviving to that year, and incorporated in the averages.

y is the year of merger.

TABLE I.B.

The standardised profitability of amalgamations, before and after merger: adjusted profitability (diversification study).

Year	Same 3 digit			Other 3 digit			Other 2 digit		
	F_z	S_{fz}	n	F_z	S_{fz}	n	F_z	S_{fz}	n
y-3	0.982	0.300	102	1.119	0.244	30	1.128	0.241	81
y-2	1.043	0.265	102	1.128	0.308	30	1.211	0.245	81
y-1	1.062	0.203	102	1.172	0.185	30	1.220	0.242	81
y	1.229	0.330	102	1.207	0.407	30	1.298	0.284	81
y+1	1.026	0.282	92	1.140	0.599	26	1.162	0.330	74
y+2	1.024	0.258	82	1.032	0.329	25	1.187	0.300	67
y+3	0.999	0.306	64	0.835	0.514	22	1.190	0.302	60
y+4	0.997	0.265	48	0.715	0.292	13	1.078	0.382	42
y+5	0.936	0.287	32	0.580	0.232	8	1.020	0.341	27
y+6	0.855	0.303	22				1.039	0.316	21
y+7	1.055	0.343	10				0.952	0.667	10

Notes:

See chapter 7, section c. for full definitions.

F is adjusted profitability as a proportion of profitability for the industry-year.

S is the standard deviation.

n is the number of companies surviving to that year, and incorporated in the averages.

y is the year of merger.

TABLE I.C.

The standardised profitability of amalgamations, before and after merger: unadjusted profitability (quartiles by X).

Year	Quartile A			Quartile B			Quartile C			Quartile D		
	R_z	S_{rz}	n	R_z	S_{rz}	n	R_z	S_{rz}	n	R_z	S_{rz}	n
y-3	1.007	0.221	54	1.055	0.337	53	1.117	0.227	53	1.048	0.277	53
y-2	1.087	0.196	54	1.106	0.356	53	1.204	0.295	53	1.081	0.226	53
y-1	1.077	0.257	54	1.165	0.232	53	1.243	0.194	53	1.066	0.185	53
y	1.340	0.371	54	1.206	0.376	53	1.247	0.225	53	1.078	0.191	53
y+1	0.994	0.252	47	1.056	0.432	48	1.147	0.317	50	1.017	0.250	47
y+2	1.088	0.256	41	1.016	0.257	43	1.214	0.292	48	0.916	0.230	42
y+3	1.014	0.384	34	0.964	0.442	32	1.182	0.334	44	0.966	0.208	36
y+4	0.945	0.342	23	0.949	0.304	21	1.154	0.438	27	0.923	0.238	32
y+5	0.856	0.338	13	0.913	0.306	13	1.061	0.348	17	0.880	0.306	24
y+6	0.746	0.288	8	0.822	0.050	7	1.286	0.291	11	0.908	0.384	18
y+7	0.443	0.335	5	0.820	0.121	3	1.290	0.374	6	1.222	0.530	7

Notes:

See chapter 7, section c. for full definitions.

R is raw profitability as a proportion of profitability for the industry-year.

S is the standard deviation.

n is the number of companies surviving to that year, and incorporated in the averages.

y is the year of merger.

TABLE I.D.

The standardised profitability of amalgamations, before and after merger: adjusted profitability (quartiles by X).

Year	Quartile A			Quartile B			Quartile C			Quartile D		
	F_z	S_{fz}	n	F_z	S_{fz}	n	F_z	S_{fz}	n	F_z	S_{fz}	n
y-3	1.007	0.221	54	1.055	0.337	53	1.117	0.227	53	1.048	0.277	53
y-2	1.087	0.196	54	1.106	0.356	53	1.204	0.295	53	1.081	0.226	53
y-1	1.077	0.257	54	1.165	0.232	53	1.243	0.194	53	1.066	0.185	53
y	1.396	0.398	54	1.248	0.427	53	1.270	0.232	53	1.092	0.199	53
y+1	1.062	0.293	47	1.095	0.480	48	1.175	0.337	50	1.039	0.270	47
y+2	1.132	0.299	41	1.035	0.263	43	1.232	0.301	48	0.935	0.252	42
y+3	1.043	0.409	34	0.964	0.440	32	1.187	0.334	44	0.977	0.215	36
y+4	0.944	0.342	23	0.949	0.293	21	1.148	0.428	27	0.932	0.243	32
y+5	0.855	0.337	13	0.917	0.303	13	1.051	0.340	17	0.885	0.309	24
y+6	0.744	0.288	8	0.827	0.051	7	1.284	0.294	11	0.912	0.387	18
y+7	0.442	0.335	5	0.820	0.121	3	1.290	0.374	6	1.221	0.533	7

Notes:

See chapter 7, section c. for full definitions.

F is adjusted profitability as a proportion of profitability for the industry-year.

S is the standard deviation.

n is the number of companies surviving to that year, and incorporated in the averages.

y is the year of merger.

APPENDIX J.

TABLE J.A

Correlation coefficients : Profitability with Growth 1964-71

Industry	Prof'blty with Growth of Net Assets	Prof'blty with Growth by Net New Investment	Prof'blty with Growth by Acquisition	Number of Observations
21 Food	0.191	0.368	-0.146	30
23 Drink	0.412	0.412	0.117	49
26 Chemicals	0.531	0.453	0.222	49
31 Metal Mfr.	0.525	0.509	0.096	43
33 Non-elect. Eng.	0.513	0.364	0.003	117
36 Electrical Eng.	0.220	0.205	-0.170	54
38 Vehicles	0.599	0.498	0.260	31
39 Metal Goods, nes.	0.268	0.240	0.008	70
41 Textiles	0.541	0.480	0.081	71
44 Clothing, footwear	0.812	0.726	0.569	33
46 Bricks, pottery etc.	0.619	0.603	0.600	40
47 Timber, etc.	0.490	0.410	0.034	32
48 Paper, Printing etc.	0.614	0.547	-0.021	57
49 Other Mfg.	0.450	0.173	0.186	39
50 Construction	0.503	0.312	0.184	57
81 Wholesale Distn.	0.608	0.560	0.226	78
82 Retail Distn.	0.639	0.430	0.278	82
88 Misc. Services	0.364	0.169	0.183	49
All Industries Pooled:	0.488	0.368	0.156	1020

Notes: Each of the variables is the arithmetic average of the corresponding ratio for each of the seven years, 1965-71 (1964 is the base year for the ratios). See Appendix F for full definitions.

The sum of observations for the individual industries falls short (by 39) of the total pooled observations: correlation coefficients were not estimated for industries with very few observations.

TABLE J.B

Frequency Distributions : Rates of Growth by New Investment in Fixed Assets (Gross) and by Acquisition of New Subsidiaries:
The Top 100 by each Variable : 1948-64 and 1964-71

% p.a. Growth by the Respective form of Expansion [a]	1948-1964		1964-1971	
	Top 100 by Investment	Top 100 by Acquisition	Top 100 by Investment	Top 100 by Acquisition
Less than 10		49		1
10 - 20	73	36	19	48
20 - 30	19	9	62	22
30 - 40	4	4	13	13
40 - 50	2	1	5	6
50 - 60	1			2
60 - 70			1	2
70 - 80	1			1
80 - 90				1
90 -100 [b]		1		4

Notes: a: A company recording the threshold value of a particular growth rate was included in the band below that value.

b: The value of any growth rate was constrained not to exceed 100% p.a. Such growth rates will therefore appear in the band, 90-100.

TABLE J.C

Growth, Financing Ratios, etc. % p.a.	Analysis by Expenditure on Acquisitions 1948-1964 Zero	Low	High	1964-1971 Zero	Low	High
Growth:						
Of Net Assets[1]	6.4	6.9	12.0	6.3	7.5	18.9
By Gross fixed investment[1]	6.3	6.9	8.6	7.9	9.2	11.6
By Net fixed investment[1]	2.9	3.1	4.5	3.5	3.8	5.5
By Takeover[1]: Total	0	0.1	4.9	0	0.3	11.7
For cash	NA	NA	NA	0	0.1	4.2
By issue	NA	NA	NA	0	0.2	7.7
Book value	NA	NA	NA	0	0.1	8.4
By retention[1]	5.3	5.2	5.9	5.3	4.6	5.8
By external finance[1]: Total	0.8	1.1	5.1	0.7	2.0	11.4
:Exchange	NA	NA	NA	0	0.2	7.7
Pre-tax rate of profit[2]	18.6	17.6	18.0	19.2	16.1	18.1
Opening size £ million	0.754	2.935	2.859	5.181	15.201	12.737
Number of companies	202	524	524	188	388	390

Notes: 1. Percent of opening net assets.

2. Percent of average net assets.

See Appendix F for fuller definitions.

TABLE J.D

Sources and Uses of Funds	Analysis by Expenditure on Acquisitions					
	1948-64			1964-1971		
	Zero	Low	High	Zero	Low	High
Sources of Funds (%)						
Issues of Ordinary Shares:						
For cash				1.2	3.7	5.6
In exchange				0	1.5	18.4
Total:	3.8	6.1	20.3	1.2	5.2	24.0
Issues of Preference shares:						
For cash				-2.4	-0.5	-0.5
In exchange				0	0.1	0.5
Total:	-0.4	0.2	1.5	-2.4	-0.4	0
Issues of Long-term loans:						
For cash				6.0	7.9	8.2
In exchange				0	0.4	6.4
Total:	1.5	3.3	6.8	6.0	8.3	14.6
Internal Sources:						
Retentions	53.1	48.9	38.2	50.8	35.3	25.4
Depreciation[1]	41.9	41.3	33.1	44.3	51.6	35.8
Total Sources:	99.9	99.8	99.9	99.9	100.0	99.8
Uses of Funds (%)						
Fixed Assets:						
Tangible: "Replacement"	41.9	41.3	33.1	44.3	51.6	35.8
Net	29.5	30.3	29.0	31.0	27.6	24.1
Intangible	0.8	0.9	1.3	0.5	1.2	1.1
Subsidiaries and Trade Investments	0	2.8	35.7	0	2.5	47.4
Stocks	21.0	26.5	29.3	27.2	27.2	26.3
Bank and Cash Balances	-1.1	-8.0	-15.1	1.5	-5.9	-13.4
Net Trade credit given	10.8	10.4	9.2	7.7	1.6	-0.2
Other current assets, provisions and sundry items	-2.9	-4.5	-22.7	-12.3	-5.9	-21.2
Total Uses:	100.0	99.7	99.8	99.9	100.0	99.9

Notes:

1. Total sources = Total uses.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.E

Appropriation of Income	Analysis by Expenditure on Acquisitions 1948-1964			1964-1971		
	Zero	Low	High	Zero	Low	High
Income (%)						
Depreciation	16.9	19.4	19.4	20.2	26.2	26.9
Operating profit	80.0	77.4	77.1	76.1	69.7	69.2
Dividends and Interest received	2.1	2.6	2.8	3.0	3.5	3.4
Other income	0.8	0.4	0.5	0.6	0.4	0.3
Total:	99.8	99.8	99.8	99.9	99.8	99.8
Appropriations (%)						
Depreciation	16.9	19.4	19.4	20.2	26.2	26.9
Interest paid (gross)	1.4	1.5	2.2	2.1	4.2	5.7
Taxation	42.6	40.2	39.7	41.2	36.9	37.2
Dividends: Ordinary (net)	16.8	15.3	15.9	15.4	14.6	14.4
Pref. (net)	2.7	2.3	2.1	1.2	1.1	0.7
Minority interests and prior-year adjustmts.	-0.1	0.3	0.5	-0.1	-0.1	-0.3
Retained profits	19.5	20.8	19.8	19.9	16.8	15.1
Total:	99.8	99.8	99.6	99.9	99.7	99.7
Cost of dividends (% of total income):						
Ordinary	19.7	17.9	18.3	25.0	23.6	23.4
Preference	3.3	2.8	2.6	1.9	1.8	1.2

Notes:
1. Income ≡ Appropriations.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.F

Balance Sheets	Analysis by Expenditure on Acquisitions: Period 1. 1948			1964		
	Zero	Low	High	Zero	Low	High
Assets (%)						
Fixed Assets:						
Tangible (net)	45.8	41.3	42.1	54.8	51.9	54.0
Intangible	3.5	5.2	6.2	1.0	1.7	5.1
Subsidiaries and Trade Investments	0.2	2.9	2.7	0	0.1	0.5
	49.5	49.4	51.0	55.8	53.7	59.6
Currents Assets:						
Stocks	40.5	43.1	42.3	34.2	40.0	41.3
Net liquidity	20.6	19.5	18.1	8.7	4.1	-2.5
Other current assets	-10.7	-12.1	-11.6	1.1	2.0	1.5
Total:	99.9	99.9	99.8	99.8	99.8	99.9
Financing (%)						
Equity interest:						
Ordinary shares	32.6	28.8	30.3	37.8	35.9	35.0
Reserves	37.9	40.6	38.9	44.5	45.1	42.1
	70.5	69.4	69.2	82.3	81.0	77.1
Preference shares	18.0	17.2	16.9	8.5	7.8	6.8
Long-term loans	3.0	3.6	3.6	3.6	5.0	8.7
Future tax reserves	7.7	7.9	8.0	5.3	5.0	5.1
Minority interests	0.5	1.7	2.1	0.1	1.1	2.1
Total:	99.7	99.8	99.8	99.8	99.9	99.8

Notes:
1. Assets ≡ Financing.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.G

Balance Sheets	Analysis by Expenditure on Acquisitions: Period 2. 1964			1971		
	Zero	Low	High	Zero	Low	High
Assets (%)						
Fixed Assets:						
Tangible (net)	57.2	54.6	52.8	60.3	59.7	60.3
Intangible	1.8	3.4	5.0	1.2	2.5	7.8
Subsidiaries and Trade Investments	0	0.2	0.5	0	0.2	0.5
	59.0	58.2	58.3	61.5	62.4	68.6
Current Assets:						
Stocks	36.9	42.3	41.7	39.4	45.9	48.5
Net liquidity	7.8	-0.3	-0.6	6.5	-2.8	-9.3
Other current assets	-3.8	-0.4	0.5	-7.5	-5.7	-8.1
Total:	99.9	99.8	99.9	99.9	99.8	99.7
Financing (%)						
Equity interest:						
Ordinary shares	37.3	36.3	37.3	32.8	31.5	30.4
Reserves	42.6	40.9	40.6	56.2	50.7	47.5
	79.9	77.2	77.9	89.0	82.2	77.9
Preference shares	8.0	6.5	5.3	4.8	4.3	2.8
Long-term loans	4.2	7.7	7.4	5.7	11.1	16.1
Future tax reserves	7.7	6.4	7.1	0.3	0.5	0.6
Minority interests	0.1	1.9	2.1	0.1	1.8	2.4
TOTAL:	99.9	99.7	99.8	99.9	99.9	99.8

Notes:
1. Assets ≡ Financing.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.H

Growth, Financing Ratios, etc.	Analysis by Gross Investment in Fixed Assets					
	1948-1964			1964-1971		
% p.a.	Low	Middle	High	Low	Middle	High
Growth:						
Of Net Assets[1]	5.5	8.0	13.3	7.4	9.6	18.5
By Gross fixed investment[1]	3.0	6.6	12.9	4.0	8.5	17.3
By Net fixed investment[1]	0.9	3.1	7.0	0.6	3.6	9.1
By Takeover[1]: Total	1.1	1.6	3.5	3.0	3.6	8.0
For cash	NA	NA	NA	1.4	1.6	2.9
By issue	NA	NA	NA	1.7	2.1	5.1
Book value	NA	NA	NA	2.1	2.8	5.4
By Retention[1]	3.9	5.5	7.2	3.3	4.6	7.8
By external finance[1]:						
Total	1.0	1.9	5.4	3.1	4.0	9.5
Exchange	NA	NA	NA	2.1	2.3	5.2
Pre-tax rate of profit[2]	15.8	18.1	19.9	14.8	17.7	20.1
Opening size £million	2.142	2.902	2.607	12.738	13.645	10.385
Number of companies	415	417	418	322	322	322

Notes: 1. Percent of opening net assets.
2. Percent of average net assets.

See Appendix F for fuller definitions.

TABLE J.I

Sources and Uses of Funds	Analysis by Gross Investment in Fixed Assets 1948-1964			1964-1971		
	Low	Middle	High	Low	Middle	High
Sources of Funds (%)						
Issues of Ordinary shares:						
For cash				2.9	2.9	6.0
In exchange				7.1	7.3	9.6
Total:	7.5	10.3	17.2	10.0	10.2	15.6
Issues of Preference shares:						
For cash				-1.9	-0.5	-0.2
In exchange				0.3	0.2	0.2
Total:	-0.4	.1.1	1.2	-1.6	-0.3	0
Issues of Long-term loans:						
For cash				5.8	7.6	9.6
In exchange				3.6	2.2	2.4
Total:	2.0	3.8	7.6	9.4	9.8	12.0
Internal sources:						
Retentions	52.9	46.8	35.6	36.8	35.8	30.4
Depreciation	37.9	37.8	38.3	45.2	44.5	41.7
Total Sources:	99.9	99.8	99.9	99.8	100.0	99.7
Uses of Funds (%)						
Fixed Assets:						
Tangible: "Replacement"	37.9	37.8	38.3	45.2	44.5	41.7
Net	13.9	33.4	41.4	6.7	31.9	42.0
Intangible	1.3	1.0	0.8	1.0	1.1	0.9
Subsidiaries and Trade Investments	17.1	14.7	16.7	19.5	18.6	22.2
Stocks	31.0	27.7	21.6	25.7	26.6	28.2
Bank and cash balances	-13.6	-9.2	-6.7	-1.6	-10.7	-10.0
Net trade credit given	18.3	7.3	4.5	8.3	2.7	-4.8
Other current assets, provisions and sundry items	-6.0	-12.7	-16.7	-4.9	-14.7	-20.4
Total Uses:	99.9	100.0	99.9	99.9	100.0	99.8

Notes:
1. Total sources ≡ Total uses.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.J

Appropriation of Income	Analysis by Gross Investment in Fixed Assets 1948-1964 Low	Middle	High	1964-1971 Low	Middle	High
Income (%)						
Depreciation	14.1	18.4	24.4	22.1	23.6	30.2
Operating profit	81.4	78.4	73.4	72.3	72.6	67.4
Dividends and Interests received	3.6	2.6	1.7	4.9	3.1	2.0
Other income	0.8	0.4	0.3	0.5	0.4	0.3
Total:	99.9	99.8	99.8	99.8	99.7	99.9
Appropriations (%)						
Depreciation	14.1	18.4	24.4	22.1	23.6	30.2
Interest paid (gross)	1.8	1.5	2.1	5.2	3.7	4.2
Taxation	44.4	41.0	35.9	40.7	39.0	34.0
Dividends: Ordinary (net)	17.3	15.4	14.7	16.6	15.2	12.3
Pref. (net)	3.3	2.2	1.4	1.3	1.0	0.6
Minority interests and prior year adjustments	0.4	0.3	0.3	-0.2	-0.3	0
Retained profits	18.5	20.9	21.0	14.0	17.4	18.6
Total:	99.8	99.7	99.8	99.7	99.6	99.9
Cost of dividends (% of total income):						
Ordinary	20.4	17.9	16.8	26.7	24.6	20.0
Preference	4.1	2.6	1.7	2.2	1.6	1.0

Notes:

1. Income ≡ Appropriations
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.K

Balance Sheets	Analysis by Gross Investment in Fixed Assets: Period 1 1948			1964		
	Low	Middle	High	Low	Middle	High
Assets (%)						
Fixed Assets:						
Tangible (net)	37.2	39.9	49.8	42.1	52.8	64.9
Intangible	6.3	4.4	5.4	3.0	2.3	3.6
Subsidiaries and Trade Investments	2.7	2.1	2.4	0.2	0.4	0.2
	46.2	46.4	57.6	45.3	55.5	68.7
Current Assets:						
Stocks	44.4	43.8	38.8	43.6	40.9	34.4
Net liquidity	19.3	20.8	17.2	3.9	2.8	-0.4
Other current assets	-10.1	-11.1	-13.8	7.0	0.7	-2.8
Total:	99.8	99.9	99.8	99.8	99.9	99.9
Financing (%)						
Equity interests:						
Ordinary shares	29.4	28.3	32.4	35.2	36.2	35.9
Reserves	38.0	41.9	38.5	44.7	44.3	42.1
	67.4	70.2	70.9	79.9	80.5	78.0
Preference shares	18.9	16.4	16.3	9.6	7.4	5.5
Long-term loans	4.2	3.3	3.1	4.1	5.2	9.6
Future tax reserves	7.4	8.3	8.1	4.8	5.2	5.3
Minority interests	1.8	1.6	1.5	1.3	1.3	1.5
Total:	99.7	99.8	99.9	99.7	99.6	99.9

Notes:
1. Assets ≡ Financing.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.L

Balance Sheets	Analysis by Gross Investment in Fixed Assets: Period 2 1964			1971		
	Low	Middle	High	Low	Middle	High
Assets (%)						
Fixed Assets:						
Tangible (net)	49.1	52.1	61.9	49.7	58.0	72.6
Intangible	3.6	2.8	4.9	4.0	4.0	5.2
Subsidiaries and Trade Investments	0.5	0.2	0.2	0.4	0.2	0.3
	53.2	55.1	67.0	54.1	62.2	78.1
Current Assets:						
Stocks	41.0	39.3	42.6	45.0	44.1	48.0
Net liquidity	1.8	4.7	-3.1	0.4	-2.4	-8.8
Other current assets	3.9	0.7	-6.7	0.4	-4.0	-17.4
Total:	99.9	99.8	99.8	99.9	99.9	99.9
Financing (%)						
Equity interests:						
Ordinary shares	35.4	37.5	37.7	32.4	32.0	29.5
Reserves	41.9	41.1	40.3	49.7	50.7	51.0
	77.3	78.6	78.0	82.1	82.7	80.5
Preference shares	7.0	6.4	5.5	4.5	3.9	2.9
Long-term loans	7.7	6.1	7.0	11.4	11.1	13.8
Future tax reserves	6.0	7.2	7.7	0.4	0.5	0.6
Minority interests	1.7	1.5	1.7	1.4	1.6	2.1
Total:	99.7	99.8	99.9	99.8	99.8	99.9

Notes:
1. Assets ≡ Financing.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.M

Growth, Financing Ratios, etc.	Analysis by Expenditure on Acquisitions			
	1948-1964		1964-1971	
% p.a.	Rest	Top 100	Rest	Top 100
Growth:				
Of net assets[1]	7.9	21.0	8.9	37.2
By gross fixed investment[1]	7.2	11.8	9.4	14.6
By net fixed investment[1]	3.3	7.4	4.0	7.8
By Takeover[1]:				
Total	1.0	14.3	2.1	28.6
For cash	NA	NA	1.3	7.9
By issue	NA	NA	0.8	21.5
Book value	NA	NA	1.6	19.6
By retention[1]	5.4	7.0	5.0	7.7
By external finance[1]:				
Total	1.9	12.3	3.1	26.6
Exchange	NA	NA	1.1	21.6
Pre-tax rate of profit[2]	17.9	18.4	17.1	21.2
Opening size £million	2.683	1.029	12.869	6.944
Number of companies	1150	100	866	100

Notes: 1. Percent of opening net assets.
2. Percent of average net assets.

See Appendix F for fuller definitions.

TABLE J.N

Sources and Uses of Funds	Analysis by Expenditure on Acquisitions 1948-1964 Rest	1948-1964 Top 100	1964-1971 Rest	1964-1971 Top 100
Sources of Funds (%)				
Issues of Ordinary shares:				
For cash			3.7	6.0
In exchange			4.8	35.6
Total:	9.5	36.5	8.5	41.6
Issues of Preference shares:				
For cash			-1.0	0.4
In exchange			0.1	1.1
Total:	0.4	3.0	-0.9	1.5
Issues of Long-term loans:				
For cash			7.9	5.0
In exchange			1.7	12.0
Total:	3.9	11.1	9.6	17.0
Internal sources:				
Retentions	46.8	24.9	36.2	18.0
Depreciation	39.2	24.4	46.4	21.7
Total Sources:	99.8	99.9	99.8	99.8
Uses of Funds (%)				
Fixed Assets:				
Tangible: "Replacement"	39.2	24.4	46.4	21.7
Net	29.5	30.7	27.6	20.4
Intangible	1.0	1.7	1.1	0.5
Subsidiaries and Trade Investments	11.6	68.4	14.6	68.0
Stocks	26.9	25.1	27.5	21.0
Bank and cash balances	-9.2	-17.1	-6.7	-14.0
Net trade credit given	10.4	4.7	2.5	- 2.2
Other current assets, provisions and sundry items	-9.6	-38.1	-13.1	-15.5
Total Uses:	99.8	99.8	99.9	99.9

Notes:
1. Total sources = Total uses.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.0

Appropriation of Income	Analysis by Expenditure on Acquisitions			
	1948-1964		1964-1971	
	Rest	Top 100	Rest	Top 100
Income (%)				
Depreciation	19.0	19.2	25.3	25.0
Operating profit	77.7	77.9	70.7	71.4
Dividends and Interest received	2.7	2.4	3.4	3.2
Other income	0.5	0.4	0.4	0.2
Total:	99.9	99.9	99.8	99.8
Appropriations (%)				
Depreciation	19.0	19.2	25.3	25.0
Interest paid (gross)	1.7	2.6	4.1	6.9
Taxation	40.5	39.2	37.9	37.8
Dividends: Ordinary (net)	15.6	17.6	14.8	13.6
Pref. (net)	2.3	1.9	1.0	0.7
Minority interests and prior-year adjustments	0.3	0.9	-0.2	0.1
Retained profits	20.3	18.3	16.8	15.6
Total:	99.7	99.7	99.7	99.7
Cost of dividends (% of total income):				
Ordinary	18.2	19.6	23.9	22.4
Preference	2.8	2.2	1.6	1.1

Notes:

1. Income ≡ Appropriations
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.P

Balance Sheets	Analysis by Expenditure on Acquisitions: Period 1			
	1948		1964	
	Rest	Top 100	Rest	Top 100
Assets (%)				
Fixed Assets:				
Tangible (net)	42.5	41.0	52.8	58.4
Intangible	4.9	10.5	2.3	11.0
Subsidiaries and Trade Investments	2.4	2.3	0.2	0.9
	49.8	53.8	55.3	70.3
Current Assets:				
Stocks	42.8	37.1	39.6	39.6
Net liquidity	18.7	24.0	2.9	-7.0
Other current assets	-11.4	-15.0	2.0	-3.0
Total:	99.9	99.9	99.8	99.9
Financing (%)				
Equity interests:				
Ordinary shares	29.3	38.4	36.0	33.5
Reserves	39.8	35.2	44.1	39.4
	69.1	73.6	80.1	72.9
Preference shares	17.4	14.7	7.6	5.8
Long-term loans	3.6	2.2	5.8	11.9
Future tax reserves	7.9	8.1	5.1	5.7
Minority interests	1.7	1.2	1.2	3.4
Total:	99.7	99.8	99.8	99.7

Notes:
1. Assets ≡ Financing.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.Q

Balance Sheets	Analysis by Expenditure on Acquisitions: Period 2			
	1964		1971	
	Rest	Top 100	Rest	Top 100
Assets (%)				
Fixed assets:				
Tangible (net)	55.0	48.6	60.3	58.5
Intangible	3.4	7.0	3.4	13.4
Subsidiaries and Trade Investments	0.2	0.8	0.2	0.7
	58.6	56.4	63.9	72.6
Current assets:				
Stocks	40.0	49.7	44.7	54.2
Net liquidity	2.0	-6.3	-2.1	-16.4
Other current assets	-0.8	0	-6.6	-10.5
Total:	99.8	99.8	99.9	99.9
Financing (%)				
Equity interests:				
Ordinary shares	36.9	36.5	31.9	26.3
Reserves	41.3	39.0	51.0	46.3
	78.2	75.5	82.9	72.6
Preference shares	6.5	4.9	3.9	2.7
Long-term loans	6.7	8.7	11.1	20.8
Future tax reserves	6.8	8.3	0.5	0.5
Minority interests	1.6	2.4	1.6	3.1
Total:	99.8	99.8	100.0	99.7

Notes:
1. Assets ≡ Financing.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.R

Growth, Financing Ratios, etc.	Analysis by Gross Investment in Fixed Assets			
	1948-1964		1964-1971	
% p.a.	Rest	Top 100	Rest	Top 100
Growth:				
Of net assets[1]	8.1	18.6	10.1	27.3
By gross fixed investment[1]	6.4	20.0	8.1	26.0
By net fixed investment[1]	3.0	11.3	3.3	14.5
By Takeover[1]:				
Total	1.8	5.6	3.9	13.5
For cash	NA	NA	1.7	4.8
By issue	NA	NA	2.3	8.8
Book value	NA	NA	2.8	8.8
By retention[1]	5.3	8.7	4.6	10.6
By external finance[1]:				
Total	2.2	9.3	4.4	15.2
Exchange	NA	NA	2.5	8.9
Pre-tax rate of profit[2]	17.7	20.0	17.0	22.1
Opening size £million	2.562	2.420	12.974	6.042
Number of companies	1149	101	866	100

Notes: 1. Percent of opening net assets.

2. Percent of average net assets.

See Appendix F for fuller definitions.

TABLE J.S

Sources and Uses of Funds	Analysis by Gross Investment in Fixed Assets			
	1948-1964		1964-1971	
	Rest	Top 100	Rest	Top 100
Sources of Funds (%)				
Issues of Ordinary shares:				
For cash			3.5	8.2
In exchange			7.6	11.5
Total:	10.9	20.6	11.1	19.7
Issues of Preference shares:				
For cash			-1.0	0
In exchange			0.2	0.2
Total:	0.6	1.6	-0.8	0.2
Issues of long-term loan:				
For cash			7.6	8.2
In exchange			2.7	3.1
Total :	4.1	8.5	10.3	11.3
Internal sources:				
Retentions	46.5	29.1	35.3	26.1
Depreciation	37.8	40.1	44.0	42.5
Total Sources:	99.9	99.9	99.9	99.8
Uses of Funds (%)				
Fixed Assets:				
Tangible: "Replacement"	37.8	40.1	44.0	42.5
Net	28.3	45.0	24.4	48.3
Intangible	1.1	0.8	1.0	0.7
Subsidiaries and Trade Investments	16.1	16.7	19.4	26.3
Stocks	27.3	20.4	26.8	27.4
Bank and cash balances	-10.2	-6.4	-6.9	-11.9
Net trade credit given	11.0	-1.0	3.6	-11.2
Other current assets, provisions and sundry items	-11.5	-15.8	-12.3	-22.2
Total Uses:	99.9	99.8	100.0	99.9

Notes:
1. Total sources = Total uses.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.T

Appropriation of Income	Analysis by Gross Investment in Fixed Assets			
	1948-1964		1964-1971	
	Rest	Top 100	Rest	Top 100
Income (%)				
Depreciation	18.0	30.3	23.9	37.2
Operating profit	78.6	67.8	72.0	60.3
Dividends and Interest received	2.7	1.5	3.5	1.8
Other income	0.5	0.2	0.4	0.6
Total:	99.8	99.8	99.8	99.9
Appropriations (%)				
Depreciation	18.0	30.3	23.9	37.2
Interest paid (gross)	1.7	2.4	4.4	3.8
Taxation	41.2	31.0	38.8	30.3
Dividends: Ordinary (net)	16.0	13.7	15.1	10.7
Pref. (net)	2.4	1.1	1.0	0.4
Minority interests and prior-year adjustments	0.3	0.3	-0.2	-0.2
Retained profits	20.1	20.9	16.6	17.5
Total:	99.7	99.7	99.6	99.7
Cost of dividends (% of total income):				
Ordinary	18.6	15.3	24.5	17.5
Preference	2.9	1.3	1.7	0.7

Notes:
1. Income ≡ Appropriations
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

TABLE J.U

Balance Sheets	Analysis by Gross Investment in Fixed Assets: Period 1			
	1948		1964	
	Rest	Top 100	Rest	Top 100
Assets (%)				
Fixed Assets:				
Tangible (net)	41.0	57.1	51.6	72.5
Intangible	5.2	6.5	2.8	5.7
Subsidiaries and Trade Investments	2.4	2.2	0.3	0.4
	48.6	65.8	54.7	78.6
Current assets:				
Stocks	42.7	38.7	40.1	34.7
Net liquidity	19.2	17.7	2.5	-3.2
Other current assets	-10.7	-22.4	2.6	-10.1
Total:	99.8	99.8	99.9	100.0
Financing (%)				
Equity interest:				
Ordinary shares	29.7	34.0	36.0	33.8
Reserves	39.5	38.6	43.8	43.0
	69.2	72.6	79.8	76.8
Preference shares	17.6	12.9	7.8	4.3
Long-term loans	3.4	4.2	5.8	12.1
Future tax reserves	7.9	8.1	5.1	4.9
Minority interests	1.7	2.0	1.4	1.7
Total:	99.8	99.8	99.9	99.9

Notes:
1. Assets ≡ Financing.
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts somteimes fail to sum to 100% because of rounding.

TABLE J.V

Balance Sheets	Analysis by Gross Investment in Fixed Assets: Period 2			
	1964		1971	
	Rest	Top 100	Rest	Top 100
Assets (%)				
Fixed Assets:				
Tangible (net)	52.8	68.0	57.1	85.8
Intangible	3.5	6.1	4.2	6.3
Subsidiaries and Trade Investments	0.3	0.1	0.3	0.5
	56.6	74.2	61.6	92.6
Current assets:				
Stocks	40.3	47.5	44.9	52.8
Net liquidity	2.2	-8.0	-2.3	-14.9
Other current assets	0.8	-13.8	-4.3	-30.8
Total:	99.9	99.9	99.9	99.7
Financing (%)				
Equity interest:				
Ordinary shares	36.8	37.2	31.6	28.6
Reserves	41.3	39.2	50.3	52.1
	78.1	76.4	81.9	80.7
Preference shares	6.5	5.0	3.9	2.2
Long-term loans	6.8	8.1	11.9	13.9
Future tax reserves	6.8	8.5	0.4	0.9
Minority interests	1.6	1.7	1.7	2.1
Total:	99.8	99.7	99.8	99.8

Notes:
1. Assets ≡ Financing
2. Fuller definitions of the variables are given in Appendix F.
3. Accounts sometimes fail to sum to 100% because of rounding.

APPENDIX K

TABLE K.A

The Relation of the Population of Acquirers Studied in Chapters 7 and 8 with the Population Studied in Chapter 9

	Acquirers Studied in Chapters 7 & 8		Acquirers Studied in Chapter 9 (1964-1971)	
	No.	% of Continuing Acquirers	No.	% of Continuing Acquirers
Top half by rate of growth by acquisition (A) of continuing companies with non-zero values of A	131	78.9	390	50.1
Bottom half by A of continuing companies with non-zero values of A	32	19.3	388	49.9
Companies with zero values of A	3[a]	1.8	188	
Companies not continuing from 1964 to 1971	45		0	
Companies excluded from the study in Chapter 9 because of extreme values for some variable(s)	2		0	
Total:	213	100.0	966	100.0
Top 100 by A of continuing companies with non-zero values of A	38	22.9	100	12.9

Notes: a: Their takeover occurred in 1972 after the close of the period studied in Chapter 9.

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PROFIT ILLUSION*

By G. MEEKS

Are profits being squeezed? Drawing data from the same basic source, two sets of observers reach quite opposite conclusions. On the one hand, Glyn and Sutcliffe (1971) and (1972) maintain that the sixties witnessed a severe decline in profitability; whilst, on the other, Panić and Close (1973) object that 'after 1960 there is simply no evidence of a significant decline in the pre-tax profitability of UK industry', and that 'the inclusion of investment grants would probably eliminate completely the downward trend in post-tax profitability between 1961 and 1969'. More recent work shows that such contradictory opinions result from different profit measures. It is the aim of this paper to pursue this theme, suggesting that different measures of profit may be appropriate for different issues. It is argued that a single measure, giving a clear answer, is appropriate for one of the issues with which both sides were much concerned: whether companies' ability to finance investment from internal sources has been curtailed.

1. THE FRAMEWORK

To demonstrate the way in which the choice of measure can so drastically affect the apparent record, and to argue for a measure appropriate to questions of internal finance, requires some discussion of accounting conventions. As a framework for this discussion, companies' gross income, the difference between their sales and all their purchases except fixed assets, may be analysed in terms of the following components, each of which will subsequently be more closely defined and evaluated:

D:	companies' historic cost depreciation provision
T:	taxation payable on the year's profits
C:	dividends and interest
A:	stock appreciation
Z:	(K − D) where K is capital consumption, at current prices
R:	net retentions, after deducting stock appreciation and capital consumption
A+Z+R:	conventional retentions as recorded by companies
P=T+C+A+Z+R:	pre-tax profits, after deducting depreciation, as conventionally recorded by companies

It is on the basis of movements in a net profit measure (R) that Glyn and Sutcliffe argue the existence of a severe profits squeeze in the sixties.[1] By contrast, Panić

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[1] In these conclusions profits appear variously as a proportion of companies' capital, or as a share in national income.

and Close's contention that profits have more or less been maintained rests on the path of the conventional measure (P). Two subsequent analyses (*National Institute Economic Review*, 1973, p. 20; Burgess and Webb, 1974) have confirmed these relative movements in R and P. Clearly, the divergence between them must be accounted for by an increase in one or more of the other components of P. In order to identify the main contributors to this divergence, the role of each component is examined in turn (sections 2 to 4) before their joint effect on the company sector's internal finance is assessed (section 5).

2. Transfers to the Government and to Shareholders

The shares of conventional profit (P) set aside for dividends plus interest and for taxation are considered first, and it emerges that neither rose over the period.[2] Table 1 shows C and T as percentages of P. The 'dividend' figure represents loan

TABLE 1

The Share of Conventional Profit Transferred to the Government and to Share- and Debenture-holders, etc.

Year	T/P %	C/P %	(T+C)/P %
1961	43.7	28.2	71.9
1962	43.5	30.6	74.1
1963	42.9	30.0	72.9
1964	42.8	29.5	72.3
1965	33.2[a]	30.0	63.2
1966	48.4	31.9	80.3
1967	40.5	31.7	72.2
1968	43.3	29.1	72.4
1969	44.6	29.8	74.4
1970	39.6	31.4	71.0
1971	40.8	30.8	71.6
1972	37.6	26.2	63.8
Averages:			
1961–66	42.4	30.0	72.4
1967–72	41.1	29.8	70.9

T = Taxes on profits + Schedule F income tax on dividends—investment grants.
C = Dividends (net of income tax) + loan interest.

[a] The unusually low figure for 1965 and the high figure for 1966 are caused by the transition between tax systems, and tend to offset one another.

Source: Derived from aggregates for U.K. quoted companies (see Department of Trade and Industry).

interest plus the net dividend receivable by the shareholder for the year: under the corporation tax system, Schedule F income tax on dividends has been included in

[2] The basic data used throughout the paper are the aggregate accounts of UK quoted companies engaged in manufacturing, distribution, etc., compiled by the Department of Trade and Industry. These figures suffer from two weaknesses. Firstly, they exclude certain small quoted companies as well as all non-quoted companies—and so account for only about three-quarters of total company profits as recorded in the Blue Book. Secondly, the population of companies changes in three years of the period (1964, 1969, 1971) so, for these years, two values are reported in the diagrams, one comparable with the previous year, one with the subsequent year. These figures are preferred to others available, for instance those in Financial Statistics, since they include information which is necessary at several stages in the argument below (such as companies' own depreciation provisions, and analysis of the figures by industry). As both Panic and Close and Glyn and Sutcliffe use the same data, the results in this paper may be directly compared with those of the main protagonists in the debate.

taxation.[3] Taxation then includes all the tax payable by the company on behalf of its shareholders (that is income tax plus profits tax in the early sixties, and corporation tax plus income tax under the later system); and it also takes account of the variety of investment incentives offered by the government during the period. In the earlier years, investment allowances and accelerated depreciation for tax purposes made the effective average tax rate (shown here) lower than the nominal rate; whilst from 1967 investment grants have (in my figures) been offset against the companies' tax liability to leave the net figure payable to the government. Comparing averages for the second half of the period with those for the first half shows that, with these definitions, the share of dividends and interest and that of net taxation are both slightly lower in the later period. Transfers to government and shareholders do not, then, appear to contribute to the decline in net retentions (R) in relation to conventional profit (P).

3. The Impact of Stock Appreciation

By contrast with taxation and dividends, stock appreciation is not a simple transfer of income, and is not recorded in companies' conventional accounts. Accordingly, a more detailed treatment is required of the way it impinges on companies' ability to finance investment.

The conventional accounting profit on a unit of output consists of its sale price less the recorded costs of the actual inputs required to produce that output. In the context of rising input prices, it is convenient to separate out one component of profit from the rest in the following way:

(a) the difference between the sale price of the output and the then current price of the inputs necessary to produce the good ($T+C+Z+R$ per unit);
(b) the difference between the current price of these inputs and the actual price paid for them earlier (A, stock appreciation, per unit).[4]

If the physical volume of stocks is to be maintained, part (b) of profit will be absorbed immediately in the purchase of new inputs (replacement stocks) at the new higher prices.[5] A monetary gain is realized, and recorded in conventional profit, but then pre-empted to maintain stocks: part (b), stock appreciation, does not augment the funds available to the company for distribution, taxation or investment. But this is not the end of the story, since in the traditional system this 'gain' is liable to taxation along with other profit.[6] This means that stock appreciation exacts a net cost in terms of funds available to the company. Moreover,

[3] This treatment of income tax on dividends is not crucial, since an alternative treatment would leave unchanged the joint proportion of P accounted for by C and T: the main argument would be unaffected. King (1973) includes this income tax on dividends in his post-tax measure of profit to which he appeals in support of his contention that the effective tax rate has fallen and companies' liquidity has not been squeezed. This paper disputes not King's figures as such but his argument that such a measure properly reflects companies' flow of internal finance.

[4] This is just a heuristic simplification; for instance, it abstracts from problems involved in the depreciation of fixed assets, which are considered below.

[5] Speculative stockholding is left out of account.

[6] The consequences for saving of the taxation of stock appreciation were recognised long ago by Keeling and MacPherson (1952).

a proportion of the stock appreciation element in total recorded profit may well actually be distributed to shareholders.[7] Thus the tax and dividends payable on part (b) pre-empt some of part (a).[8] Looking at the same process slightly differently, T and C are based on P, even though only (P – A) is available for these transfers.

This argument may be restated and developed using these symbols:

P: conventional profits, as above
S: opening value of stocks
i: rate of inflation of stock values
t: rate of tax on profits (P)
c: proportion of profits (P) distributed to shareholders

Assuming that the physical volume of stocks is maintained, stock appreciation (A) is:

$$i \cdot S \tag{1}$$

This represents the conventional profit which has to be paid out simply to maintain the physical volume of stocks. But tax and dividends are paid on the stock appreciation included in conventional profit: this additional burden equals:

$$(t+c) \cdot i \cdot S \tag{2}$$

Combining (1) and (2) gives M, the total cash pre-empted from conventional profit, which may be attributed to the traditional inclusion of stock appreciation in profit:

$$M = (1+t+c) \cdot i \cdot S \tag{3}$$

The proportion of conventional profit pre-empted by this mechanism is shown by dividing by P:

$$\frac{M}{P} = (1+t+c) \cdot i \cdot \frac{S}{P} \tag{4}$$

This gives a multiplier, $(1+t+c) \cdot (S/P)$, relating the proportion of profit pre-empted to the rate of inflation. A typical value for this multiplier for the quoted company sector is obtained by inserting in (4) average values for the sector in the late sixties:

$$t = 0.4$$
$$c = 0.3$$
$$S/P = 2.5$$

[7] This approach to dividends stems from concern with the single issue of managements' ability to finance investment: dividends are considered a 'cost' as in the managerial theories of the firm (e.g. Penrose, 1959, p. 28). Such treatment would be clearly inappropriate to, say, a discussion of wealth holders' income.

[8] A comparison may be made with the situation affecting a house-owner when the nominal value of his house rises with inflation. If he moves to a similar house the holding gain resulting from inflation is realised, but immediately pre-empted; in contrast with the firm, however, he does not have to record the apparent gain as income, and consequently does not pay tax on it.

Thus,

$$(M/P) = (1 + 0.4 + 0.3) \times 2.5 \times i$$

i.e. just 1% inflation in stock values would pre-empt 4.25% of conventional profit.[9]

This analysis of the relationship between inflation and stock appreciation is supported by Table 2 which presents estimates of actual (M/P) for 1961–72,

TABLE 2

The Rate of Inflation of Stock Values, and the Proportion of Conventional Profit Pre-Empted Directly and Indirectly by Stock Appreciation

Year	*Rate of Price Increase* %	M/P %
1961	3.8	17.5
1962	2.1	4.8
1963	3.2	14.0
1964	4.4	17.5
1965	4.2	17.7
1966	3.7	16.6
1967	2.2	11.3
1968	5.5	24.6
1969	5.1	23.3
1970	7.2	35.0
1971	6.7	30.5
1972	8.0	28.7
Averages		
1961–66	3.6	14.7
1967–72	5.8	25.6

Rate of price increase = percentage rise in consumer price index from average date of purchase of opening stocks to average date of purchase of closing stocks (Central Statistical Office).

M = (1 + t + c) × estimate of A (direct effect of stock appreciation)
t = nominal tax rate on company profit
c = average dividend payout rate gross of Schedule F income tax

Source and coverage: as Table 1.

dropping the assumption introduced for simplicity above, that physical stocks are always maintained.[10] There is an enormous range in the share of profit pre-

[9] In contrast with the earlier discussion, which emphasized the ex post shares of income transferred to government and to shareholders, here, and in subsequent calculations. I use the nominal corporation tax rate and the average dividend payout rate gross of income tax; interest is excluded because it does not vary with profit. These definitions of c and t seem appropriate because different degrees of certainty attach to these charges on income here: companies may take stock appreciation into account in their dividend decision (and thus also reduce their income tax liability) while they cannot avoid corporation tax on stock appreciation. It might be questioned whether this average value for c is appropriate: some lower marginal payout rate might be preferable in years of rising profits (see the discussion of observed dividend behaviour in Lintner (1956)). But, using a marginal rate would not substantially alter the orders of magnitude: even if c were equal to zero, the tax rate, combined with the ratio of stock to profit, would still ensure a multiplier of 3.5 here.

[10] The method of the Central Statistical Office (1968) was used, except that a single general price index (the consumer price index) was applied to stocks, whereas the C.S.O. use specific price indices for individual industries, and for each component of stock. The information necessary to emulate the C.S.O. in these respects is not available for this population of companies (different from the C.S.O.'s). However, I did try to compare my estimates with those of the C.S.O. Unfortunately, the data are not readily comparable for individual years, but a comparison is possible for the whole 12 year period; and scaled down appropriately, the C.S.O.'s

empted by stock appreciation: taking the extreme values, it is over a third in 1970 compared with less than 5% in 1962. The rise in the rate of price increase during the period has caused a striking increase in the absolute value of M (documented in section 5); and the average value of (M/P) is over 10 percentage points higher in the second half than in the first half of the period.[11] Inflation, via the stock appreciation mechanism, clearly made a major contribution to the divergence of P and R.[12]

4. Depreciation Provisions and Replacement Costs

On the face of it, fixed asset replacement poses a problem similar to that for stock appreciation. It might be supposed that because of rising fixed asset prices depreciation provisions based on historic cost would be inadequate to finance fixed asset replacement; part of conventional profit would then be preempted for asset replacement; and this pre-empted profit would nonetheless incur tax and dividends. So 'disposable' profit would again be eroded.

The C.S.O.'s response to this problem is, in effect, to re-express companies' depreciation provisions in terms of current prices (giving capital consumption). The procedure is illustrated in case A of Table 3. There it is assumed, for simplicity, that a company's assets yield a constant flow of services for five years, and then die; that real investment is constant; that fixed asset prices are rising at 5% p.a.; and that depreciation is provided on a straight line basis. Because investment is constant, the sum of capital consumption in year 5 precisely equals the cost of replacing, at year 5 prices, those assets purchased in year 0 which now expire. But the sum of year 5's depreciation provisions, the figure set aside in companies' accounts, is inadequate to finance these replacement assets: the purchase of replacement assets pre-empts 17.12 units of year 5's conventional profit. In such a case the argument is indeed analogous with that for stock appreciation.

However, this result can change crucially if real investment is growing. This is illustrated in case B of Table 3, which is in all respects similar to case A, except that real investment is growing at 8% p.a. The cost, in year 5, of replacing year 0's investment is the same (127.63); the excess of capital consumption over companies' depreciation is slightly greater than in case A of Table 3; but year 5's total historic cost depreciation provision is now more than enough to finance the replacement of year 0's investment: in fact 1.98 units of depreciation are left over.

More generally, if investment is on the increase, the cost of replacing those assets which expire in the current period will differ not only from the current

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total estimate of stock appreciation for 1961–72 was within 1 per cent of my total estimate. So I doubt whether my crude use of the single index significantly distorts the general picture for the aggregates.

[11] The relationship between (M/P) and i does change between years, so that for instance, a rise in i in 1972 is accompanied by a fall in (M/P). The absolute value of M has varied closely with i, but changes in P (particularly in response to changes in the level of activity in the economy) sometimes offset these changes in M.

[12] M here includes part of T and C considered in section 2, to illustrate the interaction of inflation and the conventions used in assessing tax liabilities and setting dividend payments. While section 2 concluded that T and C had not risen as a proportion of P, since, however, A has risen as a proportion of P, T and C have accounted for a larger share of (P – A) in the later part of the period.

TABLE 3

The Relation Between Replacement Costs, Companies' Historic Cost Depreciation Provisions, and Capital Consumption

Year	*Price index at end of year*	CASE A *Nominal investment Real investment constant*	CASE B *Nominal investment Real investment grows at 8% p.a.*
t	N_t	G_t	G_t
0	100.00	100.00	100.00
1	105.00	105.00	113.00
2	110.25	110.25	127.69
3	115.76	115.76	144.29
4	121.55	121.55	163.05
5	127.63		

	CASE A	CASE B
Historic cost depreciation		
Provided in year 5		
$(D)=\sum_{0}^{4} Y_t$		
where $Y_t=0.2\times G_t$	110.51	129.61
Current cost depreciation		
For year 5 (=capital consumption, $K)=\sum_{0}^{4} Y'_t$		
where $Y'_t=0.2\times G_t\times N_5/N_t$	127.63	148.65
Replacement cost		
In year 5 of fixed assets purchased in year 0		
$(I)=G_0\times N_5/N_0$	127.63	127.63

year's depreciation provisions, but also from the year's capital consumption in current prices. Moreover, total current depreciation provisions can be more than adequate to finance current replacement investment, even though the depreciation provisions made over any asset's lifetime may never be adequate to replace that particular asset when it dies.[13] Despite inflation, no profit need be pre-empted.

A paper by Domar (1953) specifies this relationship between replacement investment and depreciation provisions algebraically.[14] Domar obtains the general formula:

$$\frac{I}{D}=\frac{m(u+i)(1+i)^m}{[1+(u+i)]^m-1} \tag{5}$$

where I: replacement cost of those assets now due for retirement

D: depreciation provisions (historic cost)

m: lifetime of fixed assets

u: annual rate of growth of real gross fixed investment

i: annual rate of fixed asset prices

[13] Depreciation may be even greater in relation to immediate replacement costs to the extent that companies adopt a reducing balance method of depreciating assets, which gives greater weight to recent purchases. This practice is not uncommon (see Chartered Accountants' Trust for Education and Research, 1972, p. 30).

[14] An earlier version of this paper relied upon specific examples to support the argument that follows. I am grateful to Mr. E. F. Jackson for referring me to Domar's more general work.

This expresses the ratio of replacement costs to depreciation as a function of the lifetime of fixed assets, the rate of growth of investment and the rate of price increase,[15] with (I/D) varying inversely with u, but directly with i. This is exactly the relationship illustrated with the numerical example in Table 3, and it yields the same specific results as Table 3. The formula can be used to estimate on the one hand the level and, on the other, the trend in (I/D) for the UK quoted company sector.

Substitution in (5) of typical values of m, u, and i shows the order of magnitude of (I/D) for the sector. A value of 30 years for m was suggested by Domar, and more recent work does not make this appear unreasonable (see Dean, 1964, p. 330).[16] The average rate of growth of real investment (gross domestic fixed capital formation at constant prices) between 1948 and 1972 was in the region of 4.5% p.a.; whilst the C.S.O.'s fixed asset price index has on average risen by roughly 4% p.a. during the period.[17] Substituting these estimates in Domar's formula (5) yields a value of somewhat below 80% for (I/D): the rate of growth of real investment has in the event been sufficient to raise depreciation above replacement costs. According to these estimates, then, fixed asset replacement has not functioned in the same way as stock appreciation: far from pre-empting part of conventional profit, asset replacement costs have typically fallen short of companies' (historic cost) depreciation provisions, and part of depreciation has in fact been available for net investment.[18]

However, though historic cost depreciation provisions have typically augmented disposable profit during the period, rising asset prices will have contributed, along with the stock appreciation mechanism, to the downward trend in the ratio of disposable to conventional profit. Because of the positive relation between (I/D) and i, with the acceleration in the rate of fixed asset price increase from around 1969, (I/D) will, other things equal, have been rising, and the surplus of depreciation provisions declining. It seems unlikely that the increase in i has in fact been offset by changes in u and m: the growth of real investment (u) has actually slackened recently (see addendum). To some extent, changes in i and u may be expected to reinforce each other: a vicious circle can be envisaged whereby a rise in i increases (I/D) and the consequent squeeze on internal finance depresses u—a

[15] The principal assumptions on which the formula rests are parallel with Table 3: straight line depreciation; constant asset lifetime (m); and smooth and steady rates of growth of real investment (u) and of price increase (i).

[16] Even were the shorter lifetimes reported by Shonfield (1965, p. 42) for I.C.I. more common than this estimate of m assumes, the chief conclusion of this section would still hold. With m halved to 15 years, replacement still typically falls short of depreciation.

[17] These approximations of i and u were derived from Table 16 and 55 respectively of Central Statistical Office (1972, and earlier years).

[18] With depreciation equivalent to about 35 per cent of conventional pre-tax profits at this time, that fifth of depreciation left over after replacement corresponds to about 7 per cent of profit. Merrett and Sykes' (1974) advocacy of current cost depreciation (capital consumption) in arriving at a profit measure appropriate for analysis and as a tax base entirely ignores the fact that historic cost depreciation probably still comfortably exceeds replacement costs; and that the 'free' depreciation currently allowed for tax purposes will typically exceed replacement costs by an even greater margin.

Glyn and Sutcliffe (1971) and (1972) also deducted capital consumption from profit; again, the figures they report (R) understate the level of effective savings available to companies for immediate investment.

process which itself further raises (I/D). Even were u to remain stable at past levels, however, if the rate of inflation continues at the present double figure levels, (I/D) can be expected to rise above unity.[19, 20]

It would be interesting to go beyond estimates of the order of magnitude and direction of change of (I/D) for the period by providing estimates for individual years. However, there would be problems in doing so; for the considerable fluctuations in gross investment which have actually occurred in the post-war period complicate the estimate of (I/D) for individual years. (I/D) becomes particularly sensitive to the choice of m, as the fluctuations in gross investment are echoed by replacement fluctuations m years later. Yet m itself is hard to estimate satisfactorily: separate estimates would be required for individual years, since the age structure of the assets to be replaced will vary from year to year simply in response to investment fluctuations in the past. These estimation difficulties could only be overcome if very detailed data on lifetimes and fluctuations were available. In any case, even the estimates of replacement costs already presented are subject to a major qualification. They rely on the assumption, as do the C.S.O.'s estimates of capital consumption, that fixed assets will be replaced with technically similar assets. By contrast, many treatments of asset replacement emphasize the role of technical progress (e.g. Salter, 1969, p. 72; Shonfield, 1965, p. 42); the incentive to replace comes not from the physical decay of old equipment, but from the superior efficiency of new; and consequently the distinction between new and replacement investment is blurred. Because of these objections to estimating replacement costs, the subsequent discussion of the level of companies' disposable income focusses on the funds available for new and replacement investment taken together.[21]

5. Quoted Companies' Aggregate Saving

The foregoing discussion in terms of profit shares has identified inflation, operating through stock appreciation and rising fixed asset replacement costs, as the cause of the increasing difference between conventional and disposable profit. Now, in Fig. 1, the courses of the various components of profit are charted in absolute terms.

From the first part of the diagram it can be seen that pre-tax conventional profits in money terms (P) have risen in most years of the period, though they suffered slight setbacks in 1962, 1966 and 1970. However, with the acceleration of

[19] Domar (1953, p. 11) shows that where m is 30 and u is 4.5 per cent p.a., a value for i of less than 10 per cent p.a. (over the asset's whole lifetime of course) is necessary to equalize replacement costs and depreciation.

[20] This whole treatment, in line with the paper's central concern with disposable funds, concentrates on the cost of replacing the current year's retirements, emphasizing companies' actual cash flows, whereas the standard approach (capital consumption) estimates the part of assets of all vintages consumed during the year. This is not to say that capital consumption may not be the appropriate concept for some issues, such as, for instance, the estimation of wealth holders' income after capital has been kept intact.

[21] In Coddington's (1970) terms, such annual figures as could be provided here would be very 'soft' numbers: derived from unreliable data and hazy concepts, they could be very misleading.

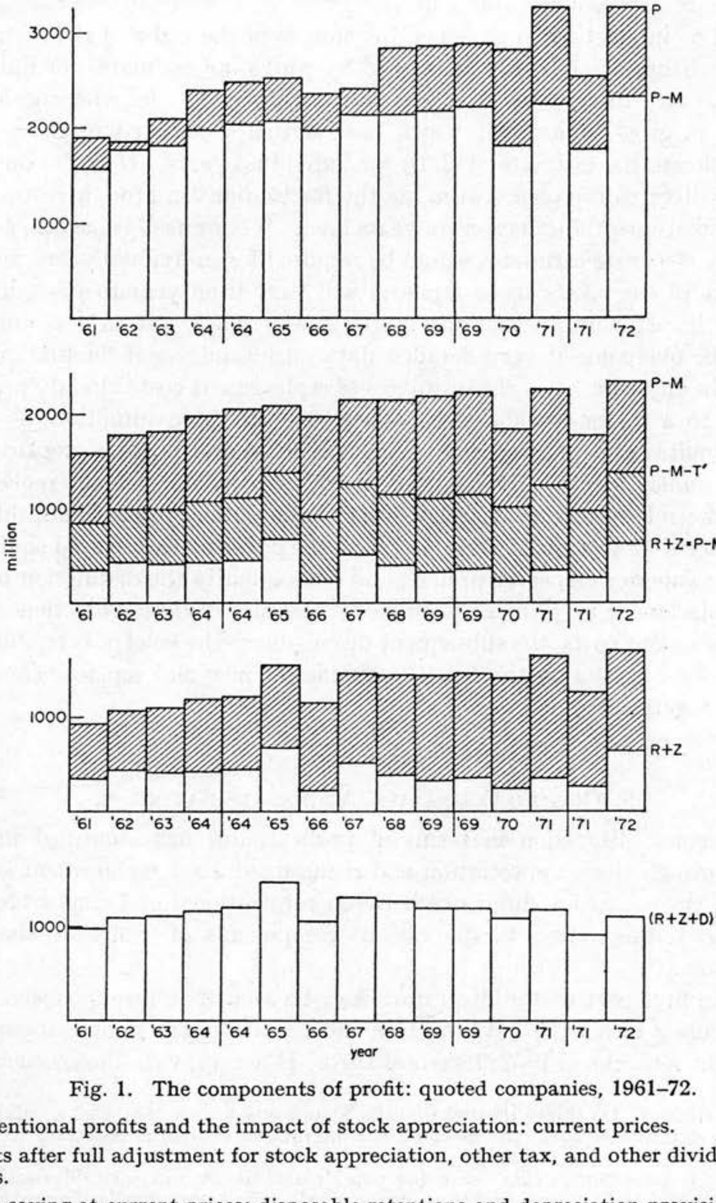

Fig. 1. The components of profit: quoted companies, 1961–72.

1. Conventional profits and the impact of stock appreciation: current prices.
2. Profits after full adjustment for stock appreciation, other tax, and other dividends: current prices.
3. Gross saving at current prices: disposable retentions and depreciation provisions.
4. Gross saving at 1963 prices.

Source: as Table 1.

inflation in the late sixties, profits adjusted for the full effects of stock appreciation (P − M) show a rather different picture. For instance, between 1967 and 1968, a rise in P of over £400 million was accompanied by a rise of only £6 million in (P − M), thanks largely to an increase in the inflation rate.[22] Again, a rise in the inflation rate in 1970 aggravated the fall in profit: a £70 million decline in P was converted into a £400 million decline in (P − M).

The second part of the diagram shows the impact of 'other tax' (T′) and 'other dividends' (C′) on (P − M). These items are defined as in section 2, except that they exclude the tax and dividends already counted as indirect costs of stock appreciation and included in M (see section 3). The resultant retentions figure (R + Z) fluctuates somewhat, especially on the change in the tax system in 1965–66; but, even in current prices, it is typically lower in the second half of the period than in the first half. In view of the argument in section 2 that the shares of tax and dividends did not rise over the period, it might seem odd that a slight upward movement in (P − M) is associated with a downward movement in (P − M − T′ − C′). This is explained by the facts that loan interest accounted for an increasing proportion of C over the period, and that since interest does not vary with profit, it was not included in M as a secondary effect of stock appreciation. So the 'dividend' component of M falls and 'other dividends' (C′), which include interest, rise over the period.

In the third part of the diagram, companies' depreciation provisions (D) are added back to (R + Z), to give a figure for gross savings at current prices available for new and replacement investment. In contrast with (R + Z), D rose in every year of the period. Indeed, because of the general rise in real investment expenditure (see section 4), even at 1963 prices (not shown) depreciation provisions increased in every year but two of the period, and by 1971 were more than 50% higher than in 1961. However, because of the decline in (R + Z) (accentuated in 1963 prices), when the joint total (R + Z + D) is expressed in 1963 prices ((R + Z + D)* in part 4 of the diagram), such buoyancy is no longer apparent. The total for 1971 is only 20% higher than that for 1961, and is lower than the typical figure for the mid-sixties. Finally, the full impact of inflation becomes evident if this real gross savings figure, (R + Z + D)*, is compared with nominal conventional profit (P) in part 1 of the diagram: the increases in P in 1967–69 are converted into decreases in (R + Z + D)* (which represents the inflation-adjusted inflow of internal funds available for the replacement of fixed assets and for expansion); while the considerable rise in P in 1971 and 1972 is accompanied by relatively tiny increases in (R + Z + D)*. Moreover, it is likely that an even sharper contrast would result if only net savings were considered (although, for the reasons given above, a precise estimate is elusive), for it has been argued in section 4 that, because of the general expansion of investment in the post-war period, the real costs of replacing fixed assets will surely have been rising; and so the squeeze on net savings will have been even more severe than that demonstrated for gross.

Evidently, the contention that the late sixties did not witness a serious decline

[22] Of course, (P − M) is only an approximate estimate and the figures mentioned should not be interpreted too precisely: but they do illustrate orders of magnitude.

in companies' internal funds available for investment does not hold; and if Panić and Close or King maintain the opposite they are suffering from profit illusion. The seeming buoyancy of conventional profit was illusory: the savings squeeze was a reality in the late sixties, and in assessments of any recovery in savings in the early seventies, the upturn of conventional profit should be heavily discounted.

As to why profits were such that net savings did decline as inflation rose, a tentative suggestion might be made here. When increases in the general level of activity are only sluggish, there is evidence that conventionally-measured profit margins stagnate or fall as managers maintain prices in the face of rising unit costs (Neild, 1963). Again, in times of inflation, if managers are susceptible to profit illusion, as some observers seem to have been, then they may fail to recoup the rising replacement costs of inputs through pricing policies, because conventionally recorded profit (based on the historic cost of inputs) appears satisfactory. These two influences, acting together in the 'stagflation' years at the end of the sixties, may be sufficient to explain the aggregate saving squeeze, presenting a challenge (or perhaps a complement) to other accounts, which, for instance, emphasize the role of increased international competition (Glyn and Sutcliffe, 1971 and 1972). But this is only speculation.[23]

6. The Uneven Impact of Inflation on Different Industries' Disposable Profits

So far, attention has been focused, as has the debate in the literature, on the aggregate record of the company sector. However, particularly striking results emerge from an extension of the analysis to compare the experience of different industries.

To consider first the impact of stock appreciation across industries: equation (4) of section 3 above provided a multiplier relating the proportion of conventional profit pre-empted by stock appreciation to the rate of inflation:

$$\frac{M}{P}=(1+t+c)\cdot\frac{S}{P}\cdot i$$

(M/P) has been calculated for each of the 22 broad industrial groups represented in the aggregates for 1970, the most recent year for which suitable data were available; as well as one which experienced an inflation rate typical of the early seventies. A single price index for stocks was used for want of specific indexes for individual industries. The estimates thus isolate influences on (M/P) other than different industry rates of stock price inflation.[24] Otherwise actual values were used. On this basis, the variation in the multiplier across industries arose chiefly from different ratios of stock to profit, rather than from different tax or dividend

[23] If managers do indeed suffer from profit illusion, this would, of course influence their incentive, as opposed to ability, to invest.

[24] It seems unlikely that different rates of inflation would systematically compensate for variation in multiplier values, and so significantly alter the range of the results; though individual industries may well have experienced rather different rates from the average used, so no great reliance should be placed on individual values. The aim is, again, simply to suggest likely orders of magnitude.

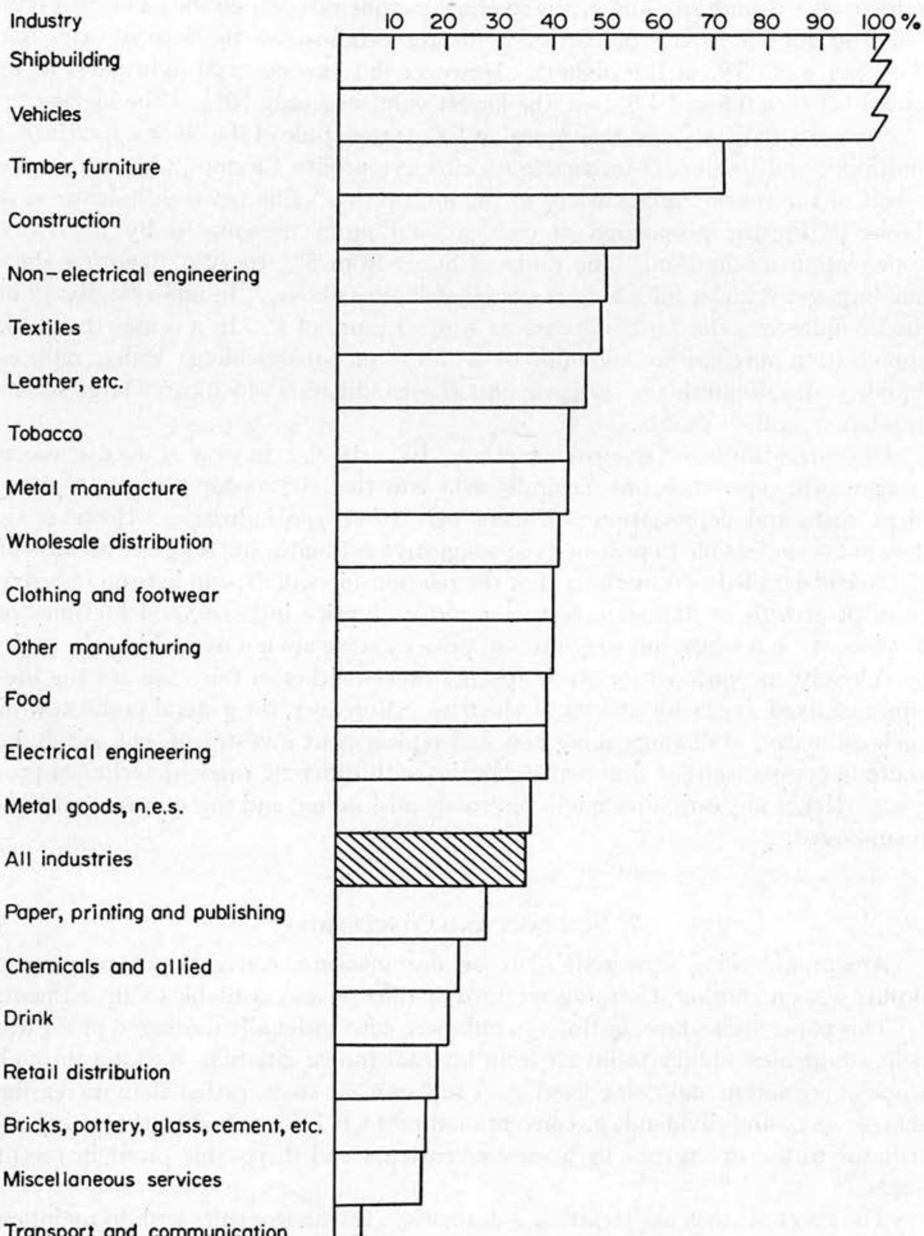

Fig. 2. Stock appreciation plus tax and dividends payable on stock appreciation (M) as a percentage of conventional profits (P): 1970.

Source: as Table 1.

payment rates. The term $(1+t+c)$ exhibited relatively little variation across industries: t is uniform, and c, the average payout rate varied only between 0.28 and 0.40 for 20 of the industries[25]: for these industries the lowest value for $(1+t+c)$ was 93% of the highest. However, for the same 20 industries, (S/P) varied between 0.5 and 4.8: here the lowest value was only 10% of the highest.

Section 3 above showed the typical order of magnitude of the stock appreciation multiplier and its impact on aggregate effective profits. Figure 2 illustrates the effects of the considerable variety in the multiplier's value between industries: it shows (M/P), the proportion of conventional profit pre-empted by the stock appreciation mechanism. The range is huge: from 5% to 72% (ignoring shipbuilding and vehicles for which M exceeded P – see above). In addition, for 12 of the 22 industries the 'cost' appears as 40% or more of P. In a sense, the stock appreciation mechanism amounts to a 'levy' on stockholdings which reduces liquidity, discriminating severely against those industries which carry large stocks in relation to their profits.

Of course, this is not the whole picture. In particular, in view of the discussion of aggregate experience, one naturally asks how the relationship between replacement costs and depreciation will have varied between industries. However, it does not seem feasible to present even suggestive estimates in this case, because of the lack of detailed information. For the relationship will depend here on industry rates of growth of annual investment, rates of price increase, and lifetimes of fixed assets: but whilst industry rates of price increase are not available—the problem already encountered for stock appreciation—neither in this case are the lifetimes of fixed assets for different industries. Moreover, the general problem with such estimates, of distinguishing new and replacement investment, will surely be acute in comparisons of different industries with different rates of technical progress. Hence any estimates might be grossly misleading, and this question remains unanswered.

7. Summary and Conclusions

Are profits being squeezed? No, on one measure, conventional accounting profit; yes, on another, the funds retained by the firm and available for investment.

This paper shows how, in times of inflation, conventionally measured profit will belie companies' ability to invest from internal funds: inflation, working through stock appreciation and rising fixed asset replacement costs, rather than increasing shares of tax and dividends in conventional profit,[26] is identified as the main contributor to the divergence between conventional and disposable profit in recent years.

The effect of stock appreciation is dramatic. If managements wish to maintain their companies' purchasing power, it is not enough that nominal earnings keep pace with the rise in prices, as it is for wage or dividend recipients. In addition,

[25] The remaining two industries, shipbuilding and vehicles, aberrated on account of negative and tiny profits, respectively.

[26] Though of course, as a share of profit less stock appreciation, tax and dividends rose over the period.

increases in conventional profits have to match stock appreciation; and since stocks are, on average, two or three times earnings, earnings must rise by a multiple of the inflation rate, if disposable profits are to be maintained. Moreover, paradoxically, continued use of the inflated conventional profit measure that includes stock appreciation actually itself reduces the ratio of effective to conventional profit: for so long as conventional profit is still used as a tax base and, one presumes, in the determination of dividends, the effect of the stock appreciation mechanism on the internal funds available for investment is aggravated.

What is more, in recent years the impact of stock appreciation has not only been drastic for aggregate disposable profits but has also discriminated severely between industries. This means that the effective tax rate on profits after stock appreciation varies a good deal from one industry to another. If it is believed that this discrimination restrains the investment of certain industries in an undesirable way, there is perhaps a case for reducing the tax bill of industries with much stock appreciation at the expense of those with low stocks in relation to profits; that is, for relieving stock appreciation of tax and (assuming that aggregate tax revenue is to be unchanged) raising the standard rate.[27]

Returning to the aggregate picture, the downward trend in real disposable funds already brought about by stock appreciation was almost certainly reinforced because, during the period, historic cost depreciation provisions probably declined in relation to the cost of replacing current retirements. However, these replacement costs probably never exceeded depreciation provisions and actually pre-empted conventional profit.

Thus, in spite of an apparently satisfactory record in the late sixties in terms of traditional profit, the real saving of the quoted company sector declined from 1967 to 1970; and the recovery in real saving in the early seventies is much less vigorous than the movement of conventional profit might suggest.

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Addendum

Has the Savings Squeeze Restrained Investment?

Investigating the consequences of companies' diminished ability to finance investment internally would require a paper to itself.[28] For a satisfactory interpretation, some notion would be required of the investment which would have been undertaken, in the absence of the savings squeeze, in response to the various

[27] Whether conventional profit is a desirable tax base is one of the topics to be investigated by the Sandilands Committee on Inflation Accounting. Against the objection that this would imply a radical change in the tax system, I would cite the argument of Parker and Harcourt (1969, p. 27) that the change would only restore the basis which obtained in times of mild inflation.

[28] Concern with the internal finance of investment stems from the returns on investment projects being uncertain. Management's ability to survive the failure of an investment project is reckoned to fall as the investment-saving ratio rises. This argument is presented in Kalecki (1937) and is used extensively by the 'managerial' theorists of the firm (e.g. Marris, 1964, p. 8, p. 204).

incentives to invest, such as pressure on capacity and expected profits. But, lacking this, a few generalizations may still be advanced about the level of investment and the way in which it was financed, on the basis of movements in the aggregate figures. Figure 3 presents the quoted companies' gross investment expressed

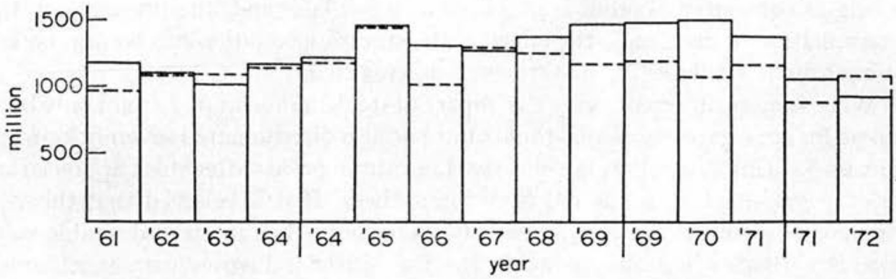

Fig. 3. Quoted companies' gross investment in fixed assets: 1963 prices.

The unbroken line represents gross investment. The broken line represents gross saving at 1963 prices (as in Fig. 1).

Source: as Fig. 1.

in constant prices, for comparison with the real gross savings aggregates provided earlier (and drawn in here too). Though it rose between 1967 and 1969, real investment scarcely increased in 1970, and it declined in 1971 and 1972. If investment was restrained by the savings squeeze (which had begun to operate by 1968), the restraint only took effect after a lag of a couple of years. Such a lag is not unreasonable: some time may elapse before a savings squeeze is recognized, especially when conventional profits appear healthy (the situation in 1968: see Fig. 1); and considerable delays are known to occur, especially for large projects, between the investment decision and the flow of investment expenditure.[29]

An alternative view would deny such a long lag and give less weight to the 'ability' constraint; it would relate actual investment chiefly to factors on the 'incentive' side, and maintain that investment would proceed despite falls in current savings provided that incentives, such as profit expectations and sales, were favourable. According to this account, the shortfall between saving and investment from 1968 to 1971 demonstrates companies' indifference between internal and external finance: shortages of saving would be offset by new issues. Table 4 traces companies' financing pattern: it is a simplified statement of the sources and uses of funds for the quoted company sector. The saving-investment ratio (column 1) certainly suffered a fall between 1967 and 1970; but the discrepancy was not made up by new external long-term finance: on the contrary, new issues declined with saving (column 2). The breach was apparently filled by reducing cash and bank balances (column 3), and by restraining the increase in working capital (column 6): procedures which might be interpreted as short-run expedients to finance commitments already undertaken.

[29] The Royal Institute of British Architects reported an average lag of 20 months from the architect's first instructions to the start of work (cited in Reddaway (1964)).

TABLE 4

Sources and Uses of Funds: U.K. Quoted Companies, 1964-72

	Sources				*Uses*			*Supplementary Information*		*Actual value of gross fixed investment (Column 5)*
Year	1 *Internal: Gross Savings*	2 *Long-term External: Share and Loan Issues*	3 *Increase in Liability to Banks*	4 *Increase in Dividend, Tax, Interest Owing*	5 *Gross Fixed Investment*	6 *Increase in Working Capital*	7 *Acquisitions for Cash and Sundry*	8 *Stock Appreciation*	9 *Acquisitions for Shares, etc.*	*£ million (Current Prices)*
1964	97	25	18	21	100	35	27	19	18	1253
1965	99	24	28	−8	100	25	17	16	18	1559
1966	79	33	8	14	100	21	13	16	19	1456
1967	101	36	−8	11	100	23	17	10	38	1443
1968	90	26	6	16	100	15	23	24	88	1609
1969	79	19	23	11	100	16	16	21	35	1835
1969	80	21	20	12	100	18	15	20	38	1840
1970	72	13	25	−3	100	−7	14	29	32	1961
1971	84	26	−29	11	100	−31	23	30	28	1963
1971	84	26	−26	11	100	−31	26	30	31	1502
1972	117	25	−58	39	100	−7	30	39	70	1461

NOTES:

Values in columns 1 to 9 are percentages of gross investment.

Total sources (cols. 1 to 4) = total uses (cols. 5 to 7), though rounding causes slight differences.

Internal (savings) = retentions (inc. investment grants)—stock appreciation + depreciation provisions (i.e. as for Fig. 1).

Share and loan issues = issues for cash only: issues in exchange for subsidiaries are netted out of columns 2 and 7, and given separately in column 9.

Increase in liability to banks = increase in liability to banks—increase in cash, tax reserve certificates, and securities.

Increase in dividend, tax, and interest liabilities: marked changes in this short-term liability occur in response to tax system changes (1965) and sudden changes in the level of profits (1970, 1972).

Increase in working capital = increase in stocks − stock appreciation + increase in debtors − increase in creditors.

Acquisitions for cash and sundry = cash paid for new subsidiaries + 'other capital expenditure'.

Stock appreciation = the direct effect included in M in Fig. 1 above.

The account does not include earlier years, since only from 1964 did the D.T.I. separate issues for cash and issues in exchange for subsidiaries. This distinction is very significant, since only the former represent new inflows of cash to the sector.

In summary, investment did decline some time after saving. Though this decline might be attributed wholly to changes on the incentive side (not explored here), the pattern of financing in the period when saving flagged but investment was maintained does not suggest that companies readily resorted to outside finance when internal sources failed: new long term external finance did not compensate for the shortage of savings. The contention that investment is restrained by saving is at least consistent with the evidence.

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